TECHNOLOGY DEPT.

FOUNDRY

SEPTEMBER
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A PENTON PUBLICATION

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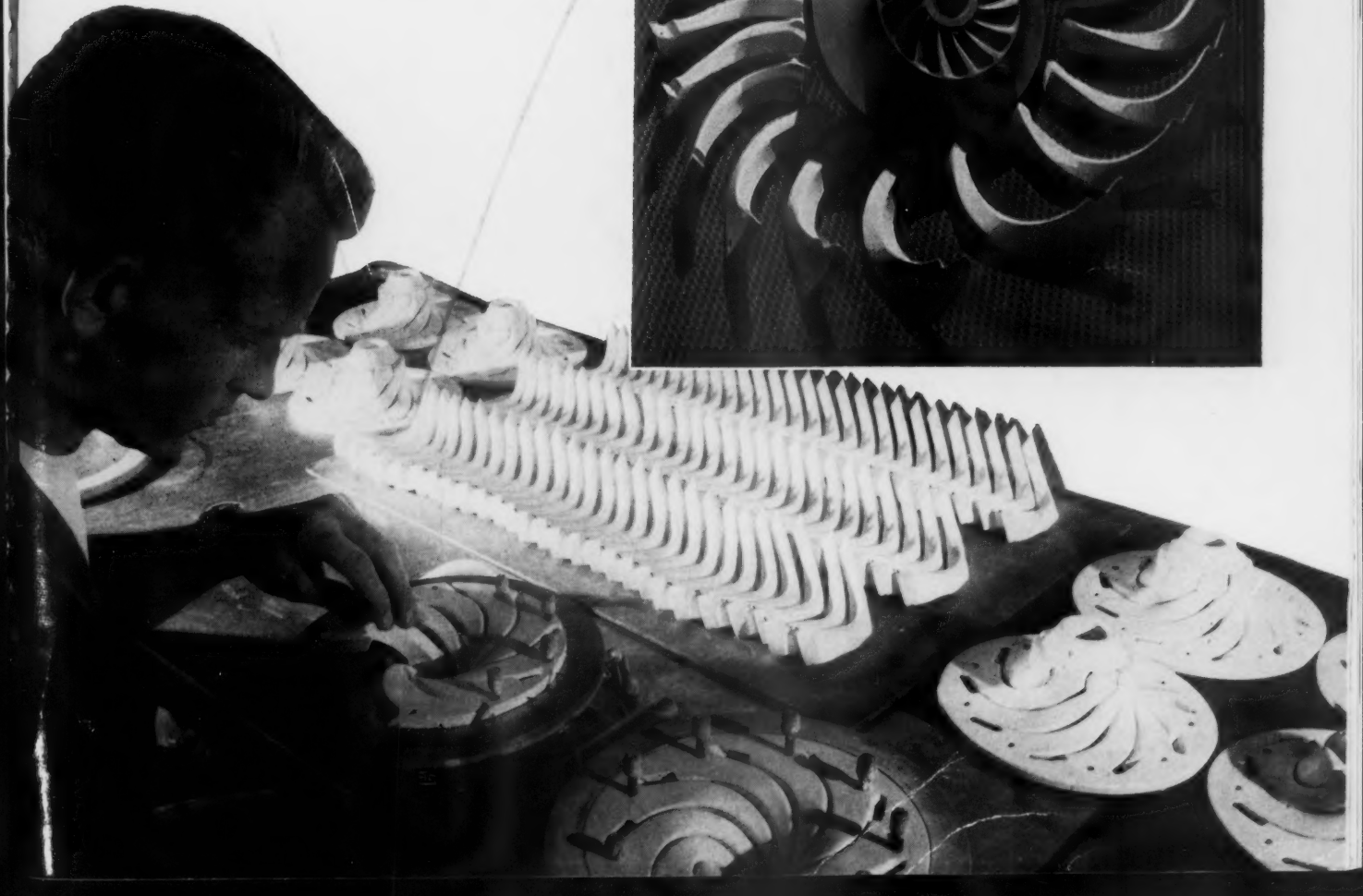
DETROIT

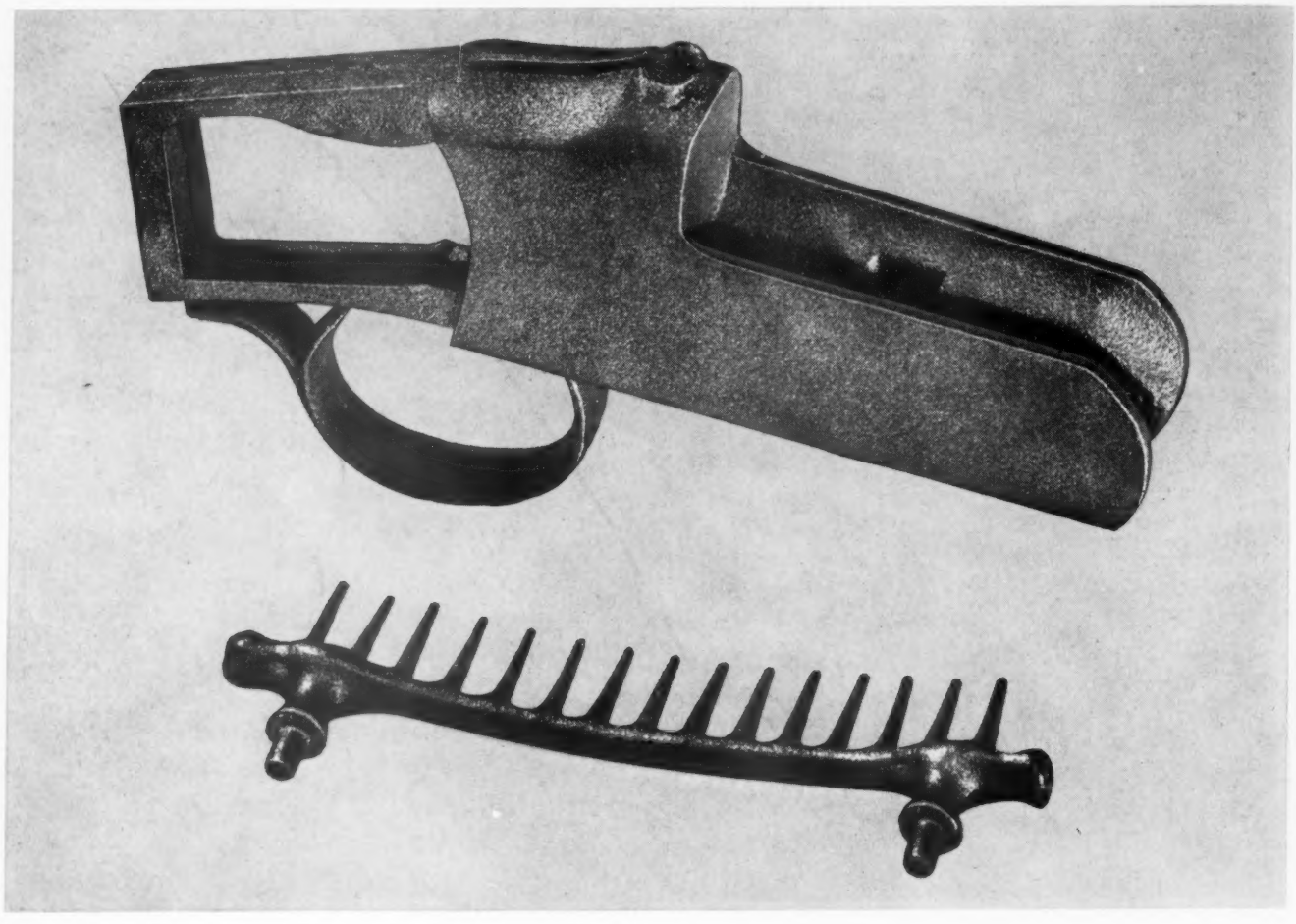
Casting High-Speed Aluminum Impellers

—page 104



R v. 84³ S-II'56

Q. How can you make THIN-WALLED GRAY IRON CASTINGS?



A. FERROCARBO® by CARBORUNDUM

REGISTERED TRADE MARK

MORE FLUID IRON is the secret of strength in thin-walled castings. When you treat your gray iron with FERROCARBO® in patented briquette form, your iron is more fluid at casting temperatures...flows more readily into thin sections and complicated molds. These castings are finer-grained, denser, stronger...with greater resistance to wear and heat shock.

YOUR CUSTOMERS GET far easier machining on castings made from gray iron deoxidized with FERROCARBO. Actual case-history machining tests in eleven leading shops prove that FERROCARBO®-treated castings averaged 89.5% *greater machinability* per tool than untreated castings.

YOU MAKE SAVINGS in raw material costs—while giving your customers these premium castings—because you can generally use cheaper melting materials in the charge. Over 600 leading foundries are now using FERROCARBO to produce superior castings, both gray iron and malleable. How about you?

FREE BOOKLET...how to use FERROCARBO, benefits, results. Write The Carborundum Company, Dept. F 84-65, Niagara Falls, N. Y.

FERROCARBO® DISTRIBUTORS:

KERCHNER, MARSHALL & CO.
PITTSBURGH • Cleveland • Buffalo
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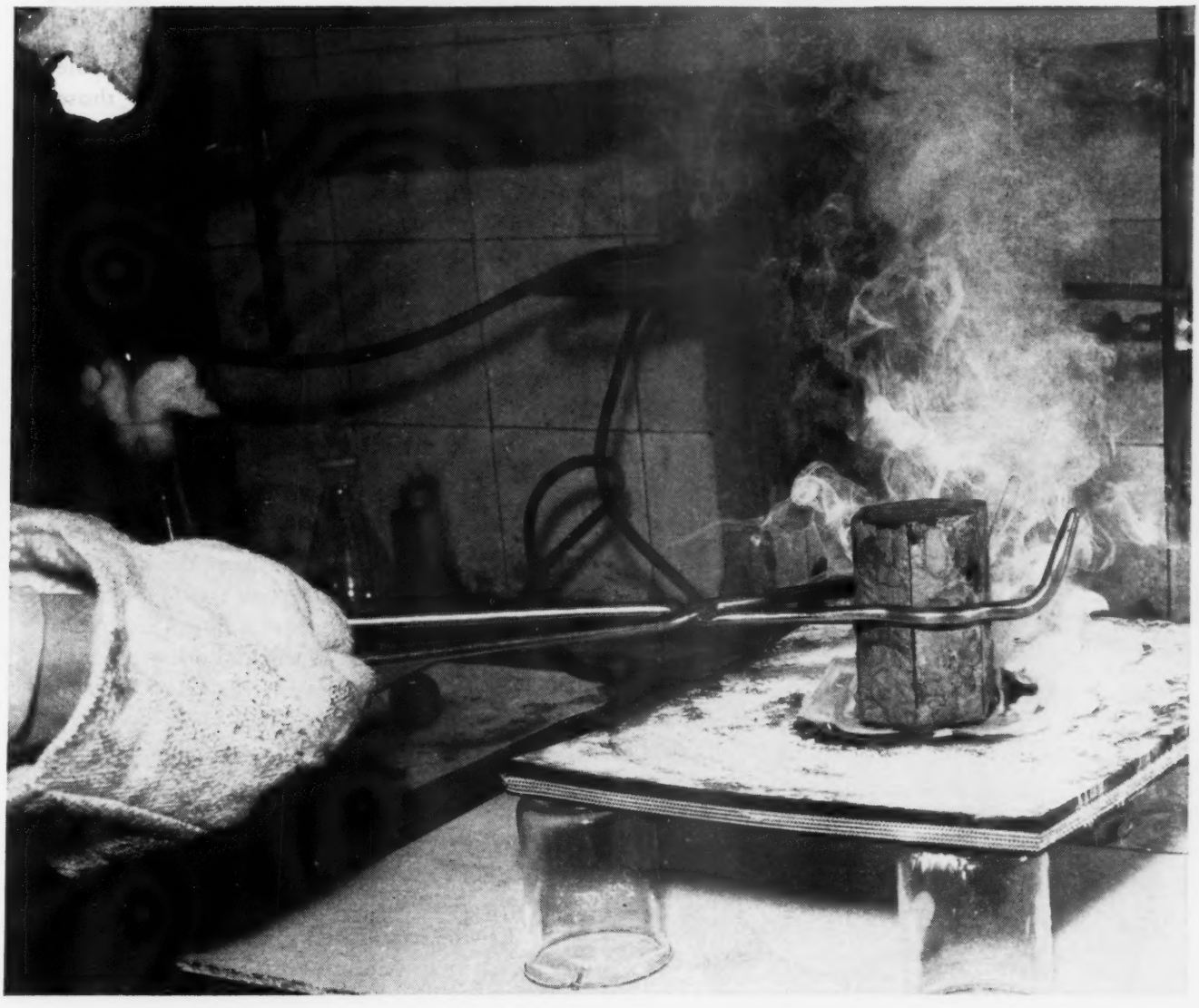
Tech

B.F.Goodrich



Red-hot metal won't burn through this B.F.Goodrich conveyor belt

New fire curtain means longer life for hot-material belts

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

The fire curtain protection is ideal for foundry service where burnt holes are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-739, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Circle 554 on Inquiry Card—Page 245

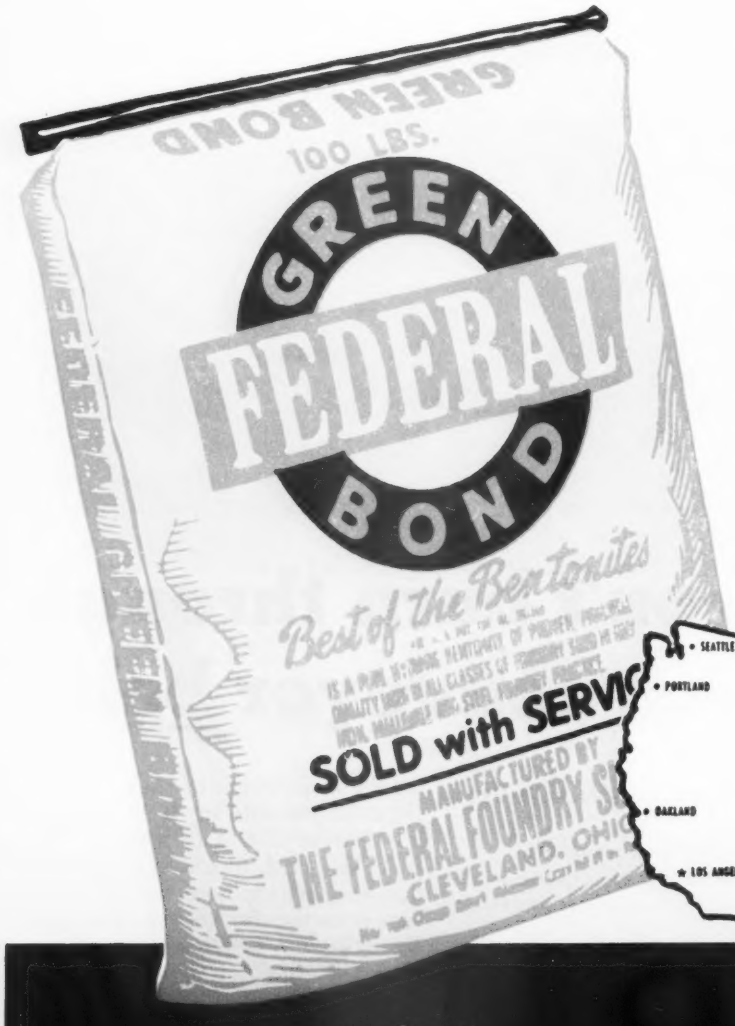
FEDERAL GREEN BOND ...THE ONLY BENTONITE WITH "NATURAL" LOW VISCOSITY

Low viscosity is a *natural characteristic* of the bentonite clay from which FEDERAL GREEN BOND is produced — *not* a property acquired through adding certain chemicals. FEDERAL engineers "test-drill" bentonite deposits *before* mining — select only those lots with a *natural low viscosity* for production of FEDERAL GREEN BOND.

FEDERAL GREEN BOND is a pure mineral product—*unadulterated, untreated.* It contains no chemicals or other ingredients detrimental to foundry sands or conditions. Its low viscosity, its ability to develop and control HIGH green and dry bond strength, its exceptionally high Ph rating (9.0) and its unerring uniformity are inherent qualities that just "come naturally" in FEDERAL GREEN BOND.

Therefore, if you want to use a bentonite that *just naturally* lets you temper your sand with lower moisture content, develop optimum strength and *save mulling time*—change to FEDERAL GREEN BOND. If you use bentonite in slurry form and want to add up to *25% more bentonite per gallon of water* for a more potent slurry, thus enabling you to provide better control of moisture content and sand strength—change to FEDERAL GREEN BOND, the best of the bentonites.

FEDERAL GREEN BOND is available in either pulverized, granular or the *quick dispersing* slurry grade—at 18 convenient distribution centers throughout the U.S.A. (see map below). Also available throughout Continental Europe.



FEDERAL

THE FEDERAL FOUNDRY SUPPLY CO.

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FOUNDRY
A PENTON PUBLICATION

September 1956
Volume 84—Number 9

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MAIN OFFICE

Penton Building
Cleveland 13, Ohio
Main 1-8260

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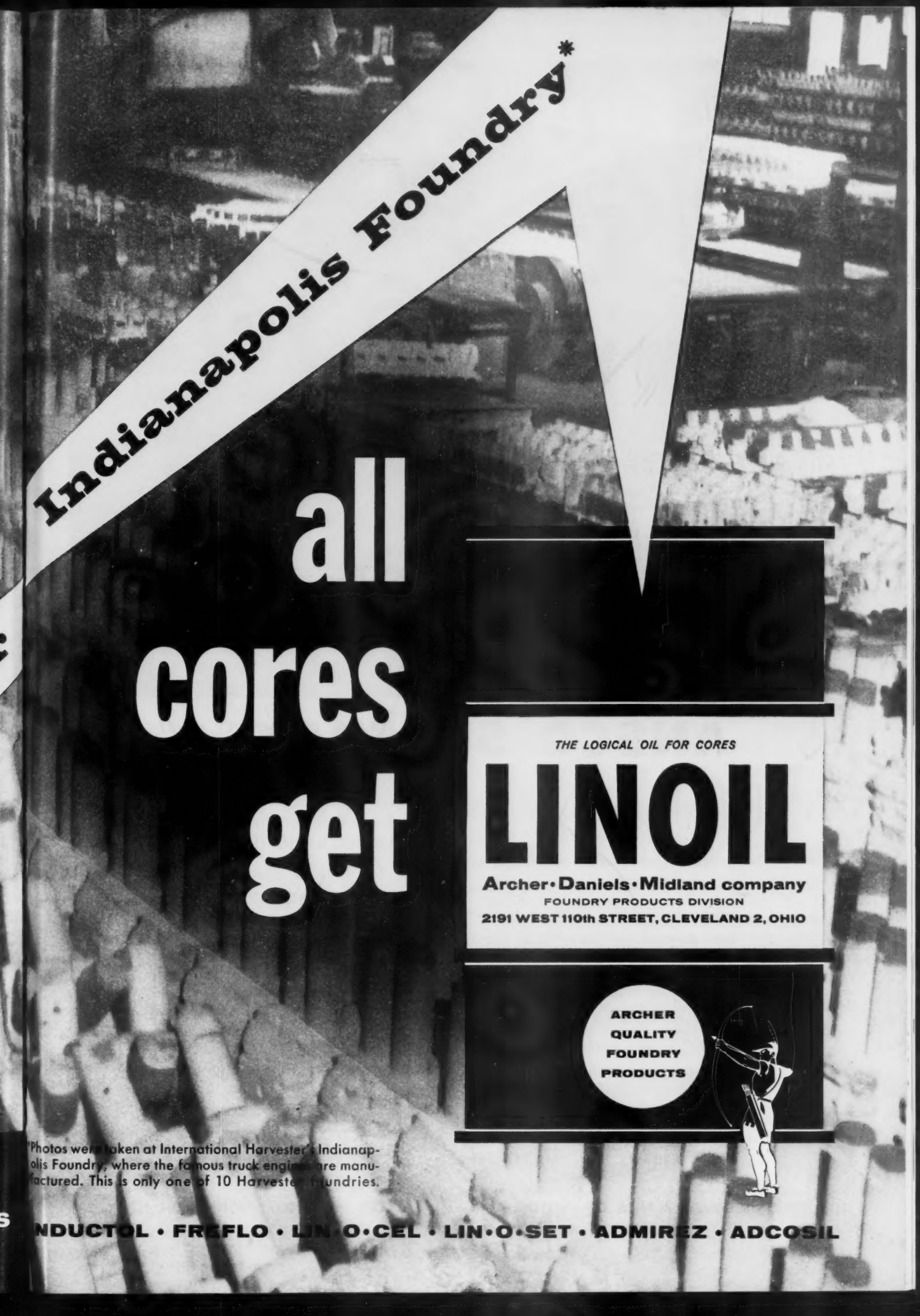
HAND CRAFTED CORES
ROTO-BLOWN CORES
SAND SLINGER CORES
at International Harvester
ADM also makes


Indianapolis Foundry*
all cores get
THE LOGICAL OIL FOR CORES
LINOIL
Archer•Daniels•Midland company
FOUNDRY PRODUCTS DIVISION
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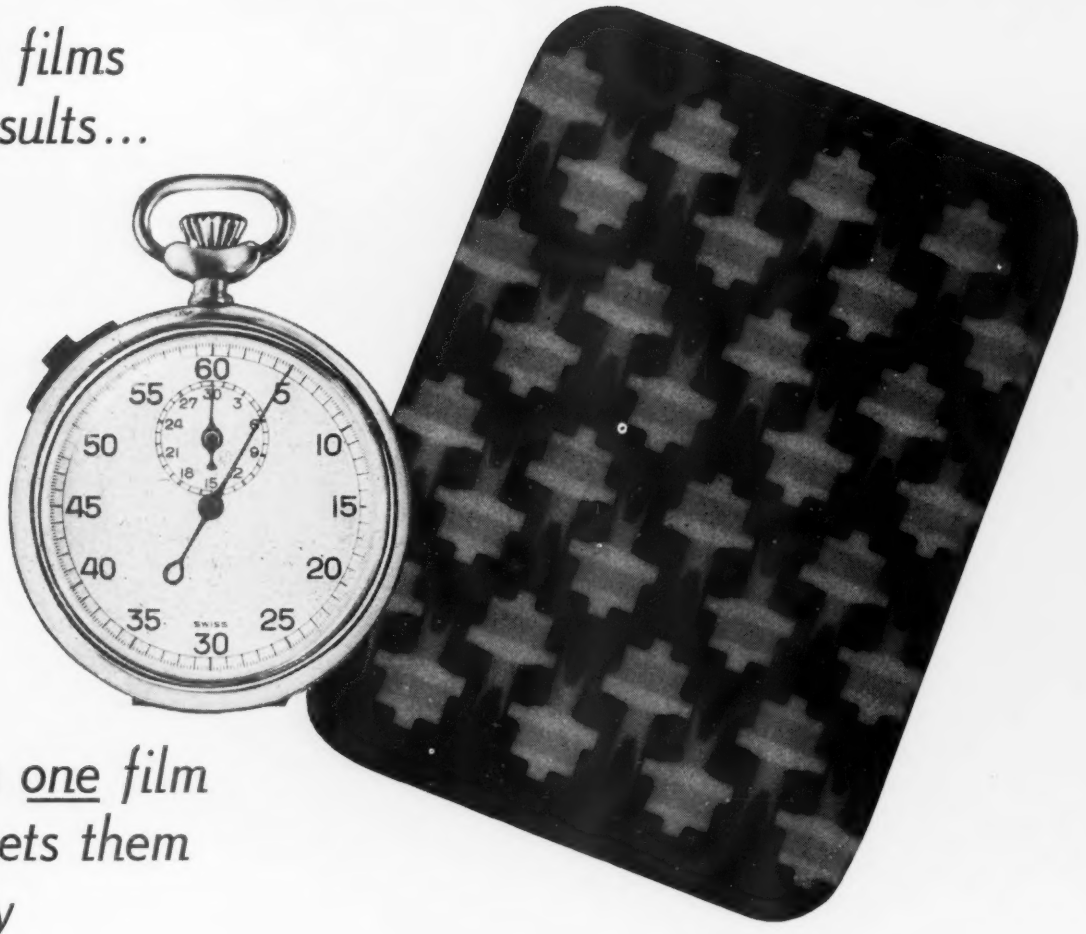
ARCHER QUALITY FOUNDRY PRODUCTS
*Photos were taken at International Harvester's Indianapolis Foundry, where the famous truck engines are manufactured. This is only one of 10 Harvester foundries.
NDUCTOL • FREFLO • LIN-O-CEL • LIN-O-SET • ADMIREZ • ADCOSIL

Many films get results...



there's one film that gets them quickly

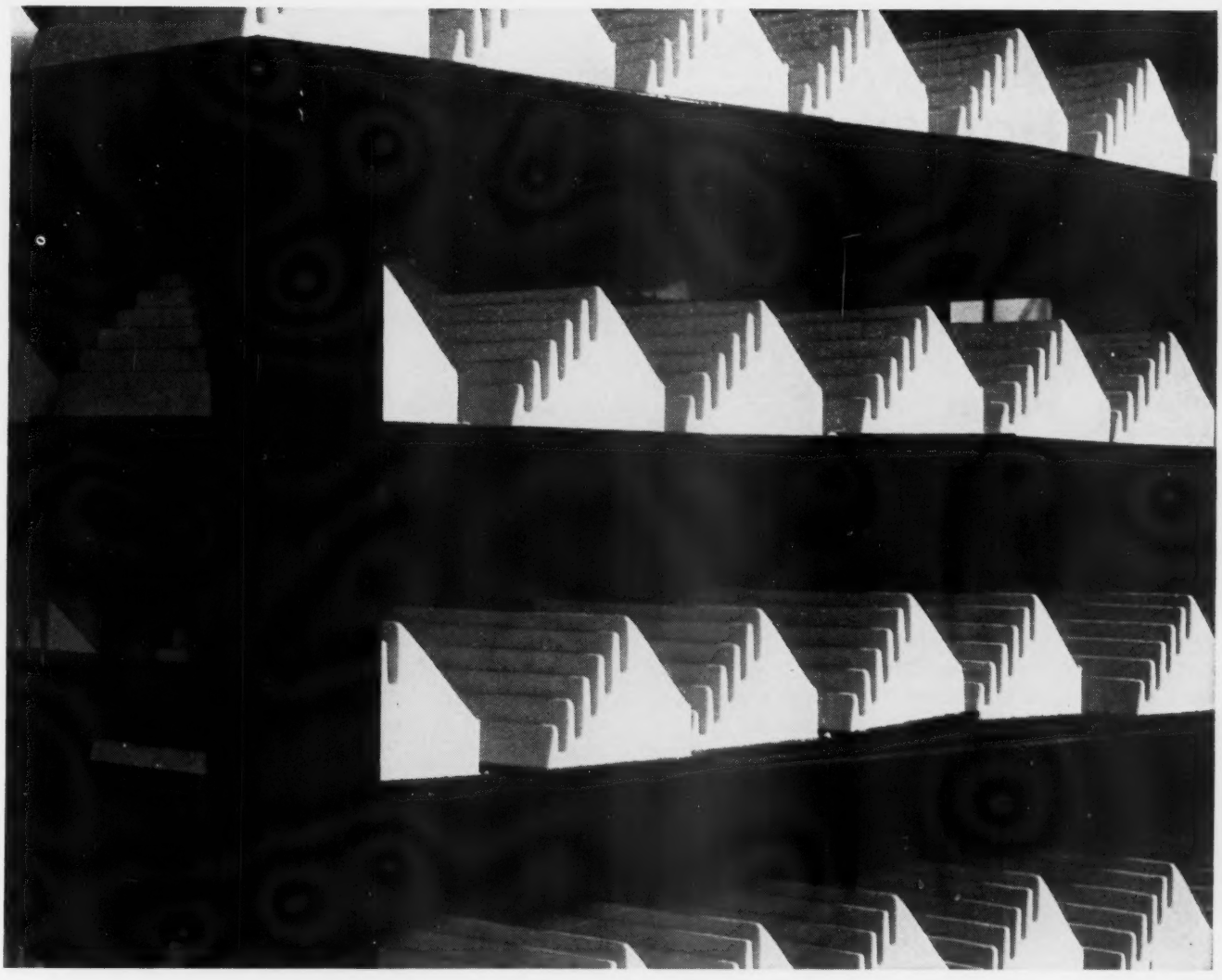
ANSCO SUPERAY "A"

Ansco Superay "A" industrial x-ray film is fast . . . slashes seconds and minutes from exposing times at low voltages and *hours* from inspection time when using radioactive isotopes. Sensitive, too—detects flaws of less than 1% at certain thicknesses. First and still the finest all purpose film tailored to meet the demands of industrial radiography. Superay "A" has increased its following every year since its introduction. *It's the standard by which all other industrial X-ray films are measured.*

RADIOGRAPHIC TECHNIQUE
for 1" thick aluminum
SUPERAY "A" X-RAY FILM

150 KVP
50 MAS
36" Distance
1.5 Density
0.005" lead screens
6 minute development @ 68F
Liquadol Developer

AMERICA'S OLDEST MAKER OF PHOTOGRAPHIC MATERIALS . . . ANSCO, BINGHAMTON, NEW YORK



HY-TEN Cores Bake Evenly, Bake Fast

With Houghton HY-TEN Core Oils and Binders, you can make even irregular cores like these bake fast . . . and bake evenly through both thick and thin sections with no burn-outs.

You'll get high green strength . . . fine-detail workability . . . low gas volume . . . complete compatibility with other core mix ingredients . . . and many other profit-building benefits with HY-TEN.

HY-TEN combines Houghton's 90 years of core-making know-how with the newest and best materials —synthetic polymers, resins, surface active agents and drying agents.

Your Houghton Man will be glad to give you the full story. If you decide to try HY-TEN, he'll follow through with personalized service to make sure you're satisfied with the improvements you get.

Call him today—or write E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

HY-TEN Core Oils and Binders

. . . products of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Circle 558 on Inquiry Card—Page 245

how to assure sound finished castings

Here are results proved by leading foundries from using Purite fused soda ash.

Sulphur control: Purite reduces sulphur content to a specified allowable per cent. When price or shortage forces the use of high sulphur scrap, you can still turn out quality castings.

Less bridging: Purite flux in the cupola increases fluidity of the charge, insuring better mix of materials, hotter melting and uniformity of process and product.

Economy: Purite is 100% fused soda ash; contains no inert waste. The solid two-pound pigs all go into the mix; none of it blows away as lost dust.

Convenience: Purite pigs are non-crumbling two-pound blocks. Handle easily. You measure out what you want simply by counting. Store indefinitely without loss.

Supply: Leading foundry supply houses distribute Purite in every area. For the name of your nearest supplier or for more information, please write—

MATHIESON

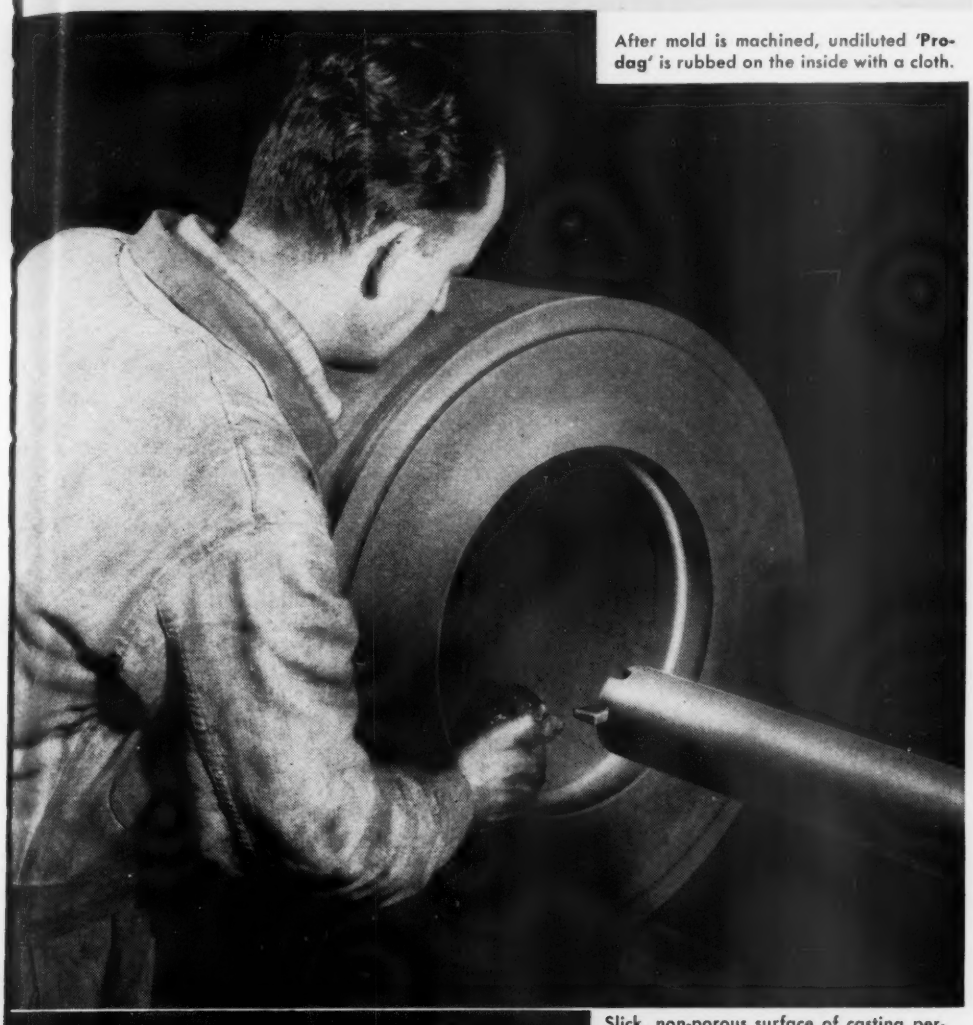
MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

3598

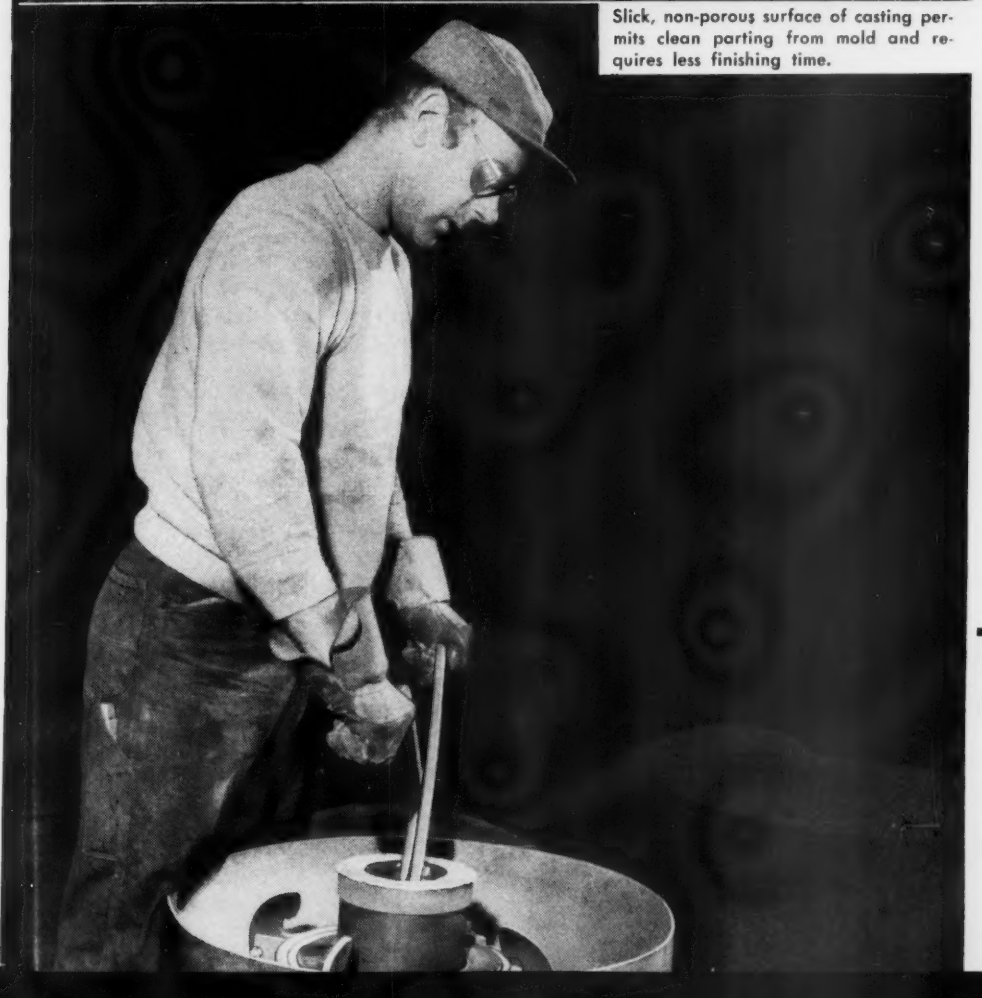
Circle 559 on Inquiry Card—Page 245

Circle 560 on Inquiry Card→

dag 'dag' dispersions... *a touch does so much!*



After mold is machined, undiluted 'Prodag' is rubbed on the inside with a cloth.



Slick, non-porous surface of casting permits clean parting from mold and requires less finishing time.

"Mold treatment with 'Prodag' for better products at low cost."

says Wisconsin Centrifugal Foundry

Wisconsin Centrifugal Foundry casts sleeve-type brass bearings in graphite molds. Castings range from 2 inches to 3(inches in diameter; pouring temperatures from 2,000 to 2,200°F. This company has found that a single application of undiluted **'Prodag'**, rubbed into the mold, lasts for entire production runs of certain items. Molten metal does not adher to the inside surface, so castings part easily. Less time is required for finishing, so rejects are fewer. **'Prodag'** helps Wisconsin Centrifugal turn out a better product at a lower cost.

'Prodag' and other Acheson dispersions have become indispensable for many foundry applications because of their remarkable properties under the most severe conditions. Acheson Service Engineers will be glad to give you specific information on the use of **'dag'** dispersion for mold coatings, maintenance lubrication, and other applications. No obligation, of course.

For ready-to-use materials containing 'dag' dispersions see your own oil supplier, or write directly to us.

100th Anniversary

1891—SILICON CARBIDE
1895—SYNTHETIC GRAPHITE
1908—COLLOIDAL GRAPHITE

ACHESON COLLOIDS COMPANY

PORT HURON, MICHIGAN

. . . also Acheson Colloids Ltd., London, England

ACHESON COLLOIDAL DISPERSIONS:
Graphite • Molybdenum Disulfide • Zinc Oxide
Mica and other solids

'dag' and 'Prodag' are registered trademarks of Acheson Industries, Inc.

Offices in: Boston • Chicago • Cleveland • Dayto Detroit • Los Angeles • Milwaukee • Philadelphi New York • Pittsburgh • Rochester • St. Louis • Toront

Acheson Colloids Company
Port Huron, Michigan, Dept. J-9

Yes, I want your free bulletin describing 'dag' Dispersions for Metalworking.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

1500-lb. SHOCK LOADS HIT THIS IMPERIAL BELT

Every 5 minutes, a 1500-lb. load of hot carbon pitch mix is dumped on this Imperial Standard Sahara Impregnation 935 Innerlocked Conveyor Belt. Temperatures of the mix are 285° to 300° F.

Since 1948 this belt (102′ long x 30″ wide x 6 ply) has been in operation 9 hours a day, 5 days a week in the Speer Carbon Co., St. Marys, Pa., plant. In addition to heat and impact, it has also withstood the damaging effects of hydrocarbons in the mix, giving excellent service throughout its long life.

Job-Designed Belting

Imperial Belts will last longer in your service because:

1. INNERLOCKED* construction, an exclusive Imperial process, permanently locks together the heavy-duty hard silver duck plies.
2. Special Imperial impregnating compounds make each brand of belting perform best under specific operating conditions.

Imperial Belts are job-designed to give you lowest ultimate belt cost and highest day-to-day operating satisfaction. Write for Data Sheet 54-2 which describes Imperial Sahara Belts for foundry service.

*INNERLOCKED—*Reg. trade mark of Imperial Belting Co.*

You expect more from Imperial . . . and you get more!

Imperial BELTING CO.

1755 S. Kilbourn Ave., Chicago 23, Ill.

Circle 561 on Inquiry Card—Page 245

With the Editors

A NEW SERVICE: A new service for the foundry industry of the United States and Canada is announced by the Penton Publishing Co. on page 206 of this issue.

Foundry Equipment and Supplies Digest, a tabloid-news type of publication, will start publication on Sept. 15, and will continue on an every-other-month basis.

Progress of the foundry industry in recent years has been accompanied by a tremendous surge in the types and varieties of machines and materials available for the production of castings. Manufacturers of foundry equipment and foundry supplies have introduced many entirely new or greatly improved products. The trend toward improvement and diversification continues.

Foundrymen are greatly interested in the latest in machines and materials. Recognizing this interest, the editors of FOUNDRY have devoted considerable space in each issue to the regular feature "New Equipment and Supplies." Readership studies show this is one of the best read sections of the publication. Therefore, readers of FOUNDRY will continue to have this service.

However, this phase of foundry progress is moving forward so rapidly and the volume of information on equipment and supplies is so large that this important service to foundrymen is being expanded through *Foundry Equipment and Supplies Digest.*

The publisher and staff hope the industry will like this new publication and will utilize its facilities in keeping up to date on what is available.

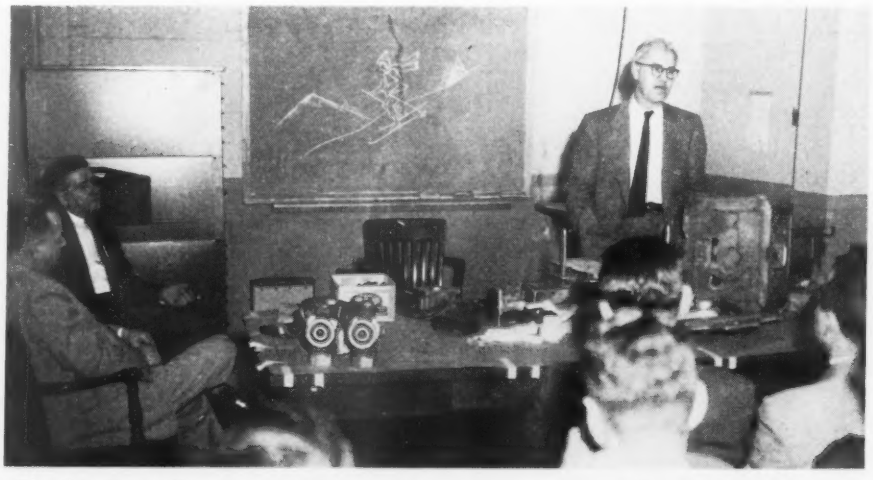
Readers of FOUNDRY in the United States and Canada will be sent the first issue in September.

—o—

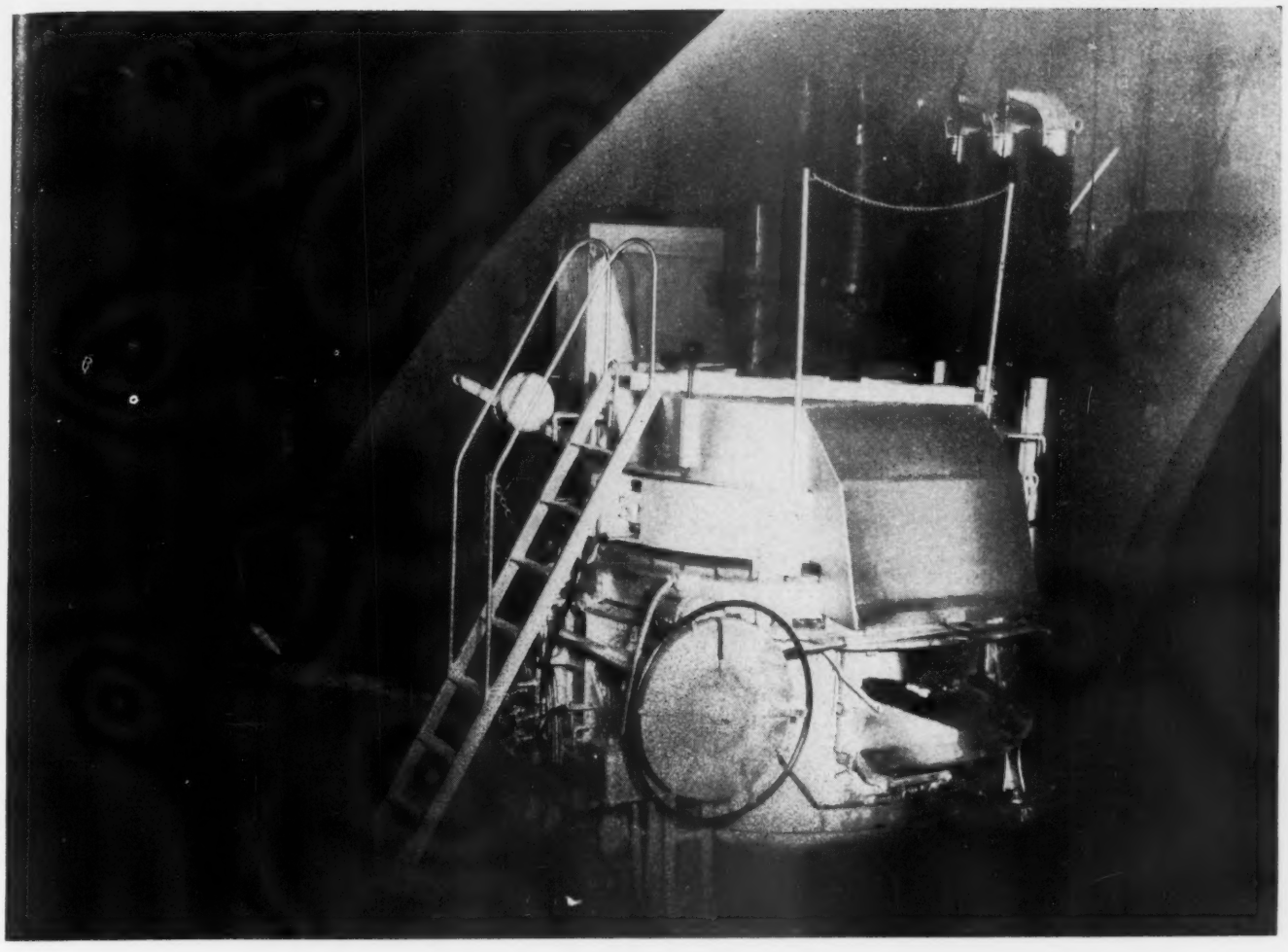
Our Congratulations: Men who devote much time to activities beyond their vocation, such as church, lodge, service clubs, charities and many others, deserve a great amount of praise and admiration. One such individual in the foundry industry is Richard H. Bancroft, manager, Castings Division, Perfect Circle Co., Hagerstown, Ind. On June 23, he was ordained a deacon of the Episcopal church in Indianapolis, and now is privileged to wear clerical vestments and perform certain clerical duties including preaching, baptizing, reading of the Gospel and administering Holy Communion. Three years of study were required to become a deacon, which is one of three orders of Episcopal clergy. Since 1953 he has been active as a lay reader and teacher at St. James Church, New Castle, and will continue to serve that church. And of course, he will continue to manage Perfect Circle's foundries.

—o—

Telling Customers — When your customers write articles on how you sell them castings, your methods must be good. Recently, *The Payloader,* published by the Frank G. Hough Co., Libertyville, Ill., published the illustration shown below and told how a panel of experts from Pelton Steel Castings Co., Milwaukee, presented "a most interesting



Charles E. Stull, vice president and works manager, Pelton Steel Castings Co., Milwaukee, addresses foremen at Frank G. Hough Co., Libertyville, Ill.



DUSTUBE erases fume problems

quickly, simply and at low cost

With Wheelabrator Dustube dust collectors, electric furnace ventilation and fume control is no more complicated than the ordinary dust control application and the cost is surprisingly low.

Using Orlon filter fabric, Wheelabrator engineers have successfully adapted the Dustube tubular type cloth filter for eliminating all visible solids from electric furnace ventilation air.

Even a knotty problem involving two furnaces at Sawbrook Steel Castings Company (above) has been solved by a Wheelabrator Dustube installation.

At Sawbrook, a 4-compartment, continuous automatic collector ventilates two electric furnaces through use of 7′ 6″ diameter roof top hoods. No fume escapes the hoods and discharge from the collector is free from visible solids even during oxygen lancing. Sawbrook collects about 300 lbs. of dust a day.

Although original gas temperature may reach 520° F. at furnace hoods, the final mixture, by the time it reaches the Orlon tubes, is below the safe temperature limit of 275 degrees. Orlon withstands ozone in the fumes, too.

Simple in design, construction and operation, Dustube regularly provides collection efficiencies of 99% and higher. For more details on how Dustube can help you, write today for Bulletin 372.

WHEELABRATOR
CORPORATION

505 South Byrkit Street
Mishawaka, Indiana

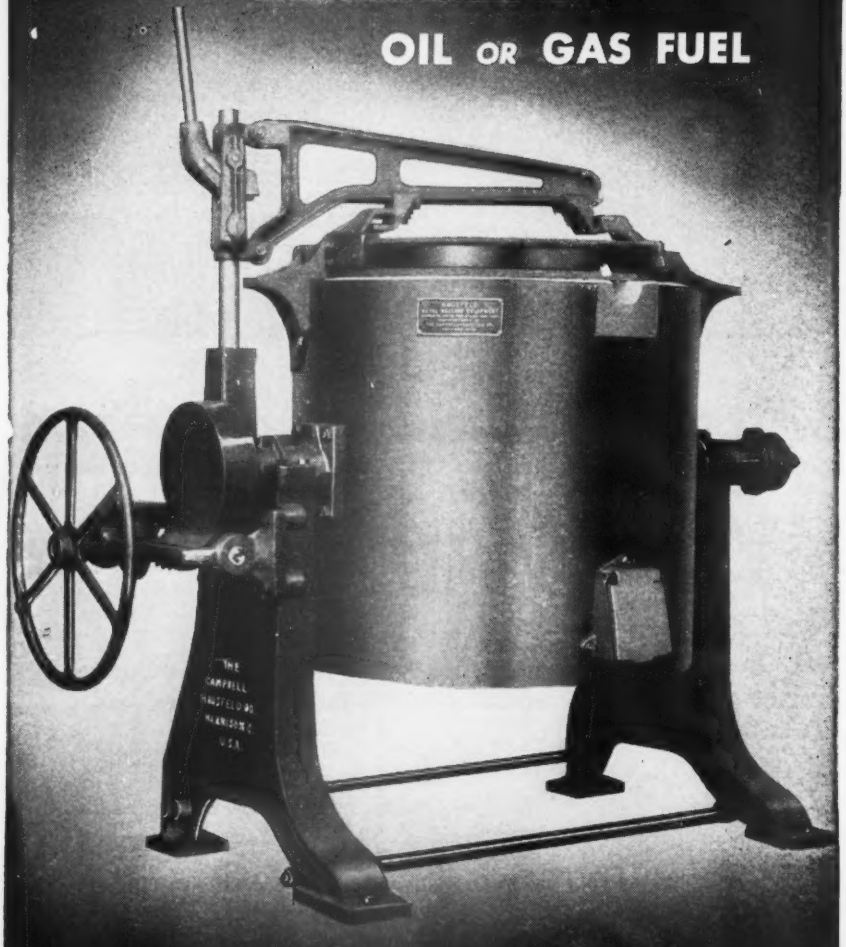
Circle 557 on Inquiry Card—Page 245

HAUSFELD

A FURNACE FOR EVERY NON-FERROUS MELTING REQUIREMENT

INTERCHANGEABLE FOR

OIL OR GAS FUEL



Built for Service

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

Circle 563 on Inquriy Card—Page 245

story of the steel casting process" to the foremen's group. The story also pointed out that "for years Pelton has been one of our major suppliers."

Pelton representatives on the panel included Charles E. Stull, vice president and works manager, who is shown addressing the group; Vernon W. Ringe, chief inspector; Andrew H. Zaborski, molding supervisor; and Harry E. Ollenburg, coreroom supervisor.

—o—

Film of Foundry Show: For foundrymen who missed the recent AFS convention in Atlantic City, and for those who would like to relive some of the pleasant moments there, Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago, has the answer.

Personnel of that company, under the supervision of I. H. Dennen, advertising manager, made a 16-mm motion picture which presents views of Atlantic City, the beach, the boardwalk and, most important, the Foundry Show in the big exhibit hall.

Their film is intended for showing with an "off the cuff" narration, and runs 35 minutes. Members of the Chicago Chapter of AFS saw it immediately after the convention and found it interesting. Other groups probably will want to see it in the fall, when the season for meetings once more gets under way.

—o—

Market Is Ripe: Did you notice the first of FOUNDRY's new promotional series on page 167 of the August issue? If you did, take a look at the second which appears on page 69 of this issue.

Reproduction of luscious fruit (a Washington apple last month and an appetizing banana this) draws attention to the striking statement that "FOUNDRY's market is ripe." It is ripe for new ideas, new methods and new products to help foundrymen meet the competition of other methods of fabrication.

The editors like the series and offer our congratulations to the business department and the agency.

—o—

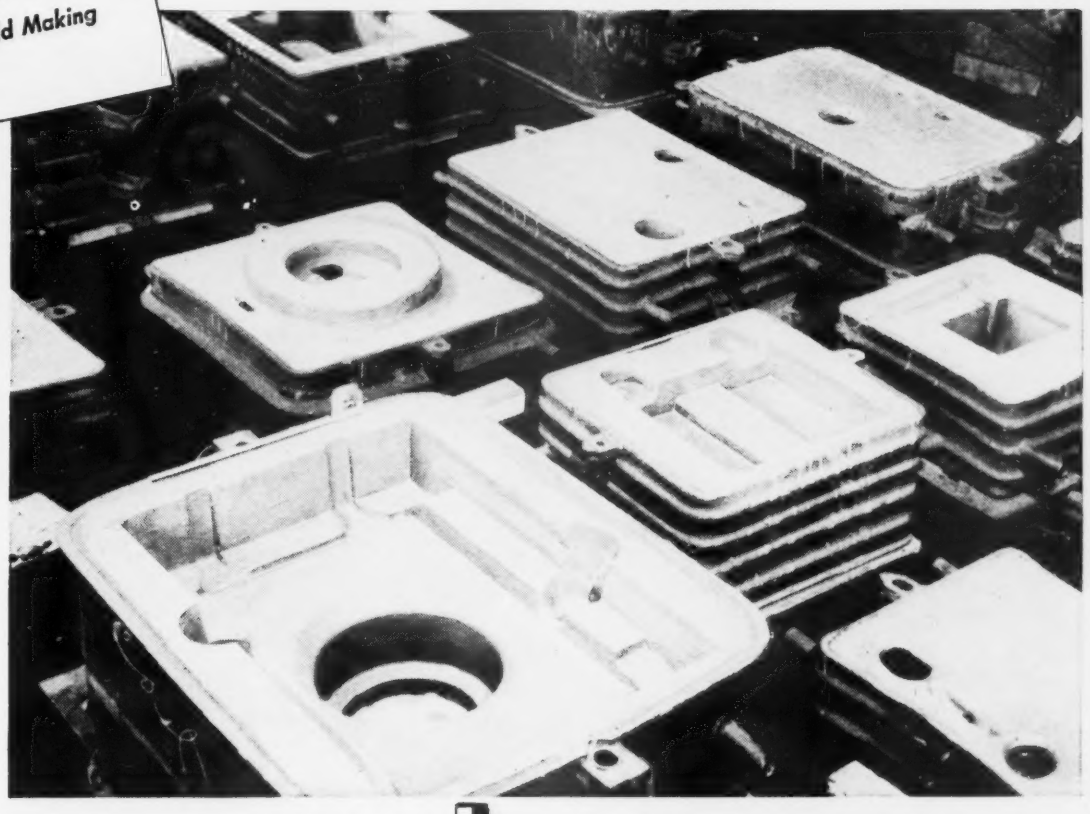
Wealth of Material: The editors of FOUNDRY who have charge of gathering, editing and preparing the editorial material for each issue tell me that this issue contains more articles covering a wider range of subjects than has been presented for a long time. They suggest that you surely will miss something of interest if you do not check the contents "from cover to cover."

F.G.S

MEMO
To: *Foundry Men*
From: G. E. Smith
Subject: Mold Making

KOLD-SET

COLD SETTING BINDER
APPLICATION REPORT



PROBLEM:

Four molders at a large foundry required 8 hours to make 7 copes and 7 drags for that many iron castings. Weights range up to 800 pounds. Mold making time had to be reduced to fit into the foundry production cycle.

SOLUTION:

The foundry added Kold-Set Binder and Activator to the sand during mulling and poured it from hoppers directly into the flasks. No rodding is required. Molds are now made by one man in three hours.

ADVANTAGES:

Labor cost was cut 75%. Production time was cut 60%. The molds are more uniform and accurate; they produce a better finish on the casting. Following cooling, the sand falls free of the casting, speeding cleaning time. Floor to floor time is stabilized.

You'll find the same money and time saving results in your own mold and core making operation with Kold-Set! Just add Kold-Set Binder and Activator to your sand in the muller. You get a foolproof free-pouring Kold-Set sand that needs no ramming, cuts rodding in half, sets rock hard in the exact time you want it to, then bakes out with uniform density and hardness.

Kold-Set is a new method of core and mold production, proved in many foundries—just like your own—to cut mold and core making time drastically . . . *and* produce consistently better, lower cost finished castings.

Get the story on how **KOLD-SET** *can help you cut mold and core costs.*

CLIP AND MAIL COUPON TODAY!

G. E. Smith, Inc.
246-A Washington Road
Pittsburgh 16, Pa.

At no obligation, please send Technical Bulletin No. 2 on Kold-Set immediately. I am attaching this coupon to my company letterhead.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

G. E. SMITH, INC.
246 Washington Road Pittsburgh 16, Pa.

Circle 564 on Inquiry Card—Page 245

Even with KIRK & BLUM Dust Control, you'd hardly expect to lunch off the floor in a busy foundry . . . but there is a vast difference between a "clean" and a "dirty" foundry. And not just in appearance! The "clean" foundry, with effective dust control, profits in reduced maintenance, in higher employee morale, in better plant-community relations and in overall efficiency. Cleanliness is vital to successful operation.

Because foundry dust control is "no picnic," put your problem up to experts. KIRK & BLUM, with more than 50 years of experience, does the complete job . . . design, fabrication and installation of efficient, dependable dust control.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK & BLUM

DUST AND FUME CONTROL

For information and literature, write The Kirk & Blum Manufacturing Company 3239 Forrer Street, Cincinnati 9, Ohio.

Circle 565 on Inquiry Card—Page 245

CALENDAR of Meetings

Sept. 11-13—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 16-22—American Society for Testing Materials, Pacific area national meeting and apparatus exhibit, Hotel Statler, Los Angeles.

Sept. 21—Malleable Founders' Society, fall meeting, Hotel Cleveland, Cleveland.

Sept. 24-25 — Steel Founders' Society of America, annual fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Sept. 24-26—Material Handling Institute, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 4-5—Magnesium Association, annual meeting, Drake Hotel, Chicago.

Oct. 8-12—American Welding Society, fall technical meeting, Hotel Cleveland, Cleveland.

Oct. 8-12—American Society for Metals, national metals congress and exposition, Public Auditorium, Cleveland.

Oct. 11-12—Armour Research Foundation, national noise abatement symposium, Hotel Sherman, Chicago.

Oct. 11-12—National Foundry Association, annual meeting, Sheraton-Cadillac Hotel, Detroit.

Oct. 18-20—Foundry Equipment Manufacturer's Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 19-20—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 19-20—Northwest Regional Foundry Conference, Seattle, Wash.

Oct. 25-26—Metals Casting Conference, Purdue University, Lafayette, Ind.

Oct. 29-30—Refractories Institute, fall meeting, The Homestead, Hot Springs, Va.

Oct. 31-Nov. 2—Gray Iron Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

Nov. 7-9—Steel Founders' Society of America, technical and operating conference, Carter Hotel, Cleveland.

Nov. 8-9—All-Canadian Foundry Conference, sponsored by Eastern Canada, Ontario and British Columbia chapters of AFS, Sheraton-Mount Royal Hotel, Montreal.

Nov. 25-30—American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York.

Nov. 29-30—Michigan Regional Foundry Conference, Union Bldg., University of Michigan, Ann Arbor, Mich.

Dec. 5-7—American Institute of Mining and Metallurgical Engineers, electric furnace steel conference, Morrison Hotel, Chicago.

1957

Jan. 18—Malleable Founders' Society, semi-annual meeting, Hotel Cleveland, Cleveland.

Feb. 4-8—American Society for Testing Materials, committee week and spring meeting, Benjamin Franklin Hotel, Philadelphia.

Feb. 14-15—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 21-22—Southeastern Regional Conference, sponsored by Birmingham and Tennessee chapters, AFS, Dinkler-Tutwiler Hotel, Birmingham.

Mar. 13-14—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 15-16—California Regional Conference, Claremont Hotel, Berkeley.

Mar. 25-29—American Society for Metals, Western Metals Congress and Exposition, Ambassador Hotel and Pan-Pacific Auditorium, Los Angeles.

Apr. 10-11—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago.

Apr. 12-13—East Coast Regional Conference, sponsored by Metropolitan, Chesapeake and Philadelphia chapters, AFS, Benjamin Franklin Hotel, Philadelphia.

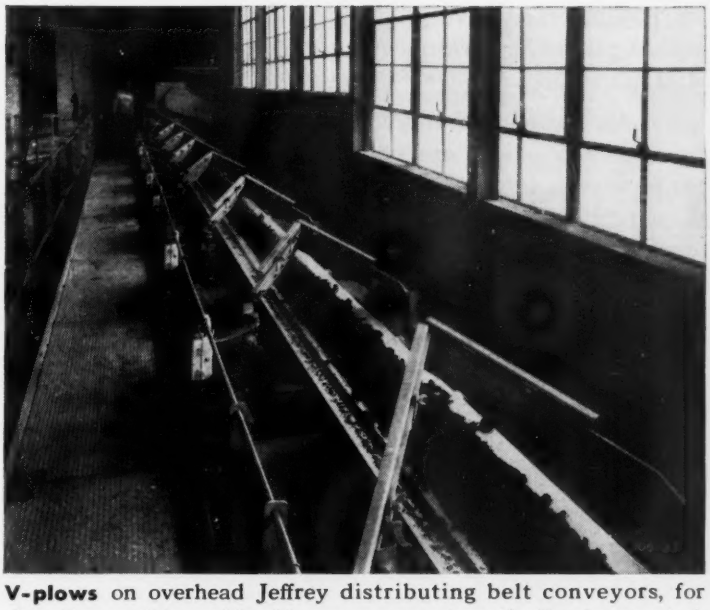
May 6-10—American Foundrymen's Society, 61st annual convention Cincinnati.

June 13-14—Malleable Founders' Society, annual meeting, The Broadmoor, Colorado Springs, Colo.

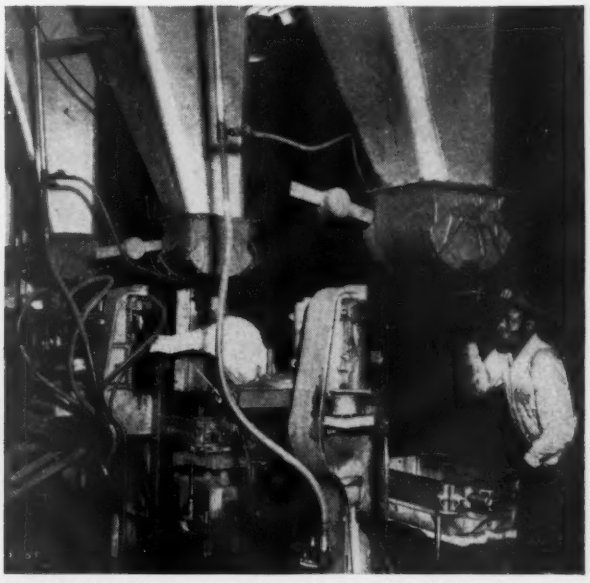
June 16-21—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

JEFFREY MECHANIZATION cuts costs for handling and conditioning sand

at Forest City Foundries Company, Cleveland, Ohio



V-plows on overhead Jeffrey distributing belt conveyors, for diverting sand to molders' hoppers, are automatically air-operated. The two distributing conveyors and the cross conveyor move at 150 feet per minute; can handle 35 tons of sand per hour.



Ten Jeffrey hoppers along one side of the foundry, and nine along the other side, supply sand to the molders' stations. Hoppers are provided with 15" by 24" foundry-type clamshell valves.

Molds are poured on roller conveyors running between molding stations and shakeout conveyor. Poured molds are dumped onto this 65-foot Jeffrey vibrating conveyor, which shakes sand loose from the hot castings as they move along.

Castings and sand drop from this vibrating conveyor into the shakeout machine. Used sand is carried away by a Jeffrey apron conveyor, passed through cleaning and reconditioning equipment, after which it is elevated to storage by a Jeffrey bucket elevator. Now it's ready to start the circuit again.

Jeffrey can mechanize a complete foundry or a single operation. Write for Catalog 845. The Jeffrey Manufacturing Co., Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Circle 566 on Inquiry Card—Page 245

A New Foundry Service by . . .

- COAT YOUR OWN SAND
- NOT A PILOT PLANT
- USE SAND TESTED IN PRODUCTION
- CAPACITY FOR 800—1200 lbs. COATED SAND PER HOUR
- YOU DETERMINE TEST CONDITIONS
- USE RESIN OF YOUR CHOICE
- WRITE FOR ARRANGEMENTS

Would you be willing to devote one half day of your time if that time could be spent in supervising controlled, production scale tests on resin coating your sand? Many Foundrymen have profited handsomely from experience gained in working with the National SHELL-MULL.

That's why the services of this simple, practical and standardized equipment are now being offered at no charge to anyone interested in increased hourly production and positive control over coated sand. The unit on the opposite page is part of National's New SHELL-MULL Performance Laboratory. It's not a Pilot Plant. The equipment is capable of producing 800 to 1200 lbs. of uniformly controlled, coated sand per hour. We can't bring it to you—but arrangements for production size tests made with your own sand, a resin of *your* choice and under *your* supervision, are now being accepted.

Results of these tests can be invaluable to you towards the more efficient production of coated sands. They will prove too, under conditions set by you, that the National SHELL-MULL will provide high production of better and more uniformly coated sand at lower operating costs (including resin usage) than any equipment offered for similar use.

Write today for details.

NATIONAL
Engineering
Company

Laboratory at 32 N. Clinton St.

646 MACHINERY HALL BLDG., CHICAGO 6, ILLINOIS

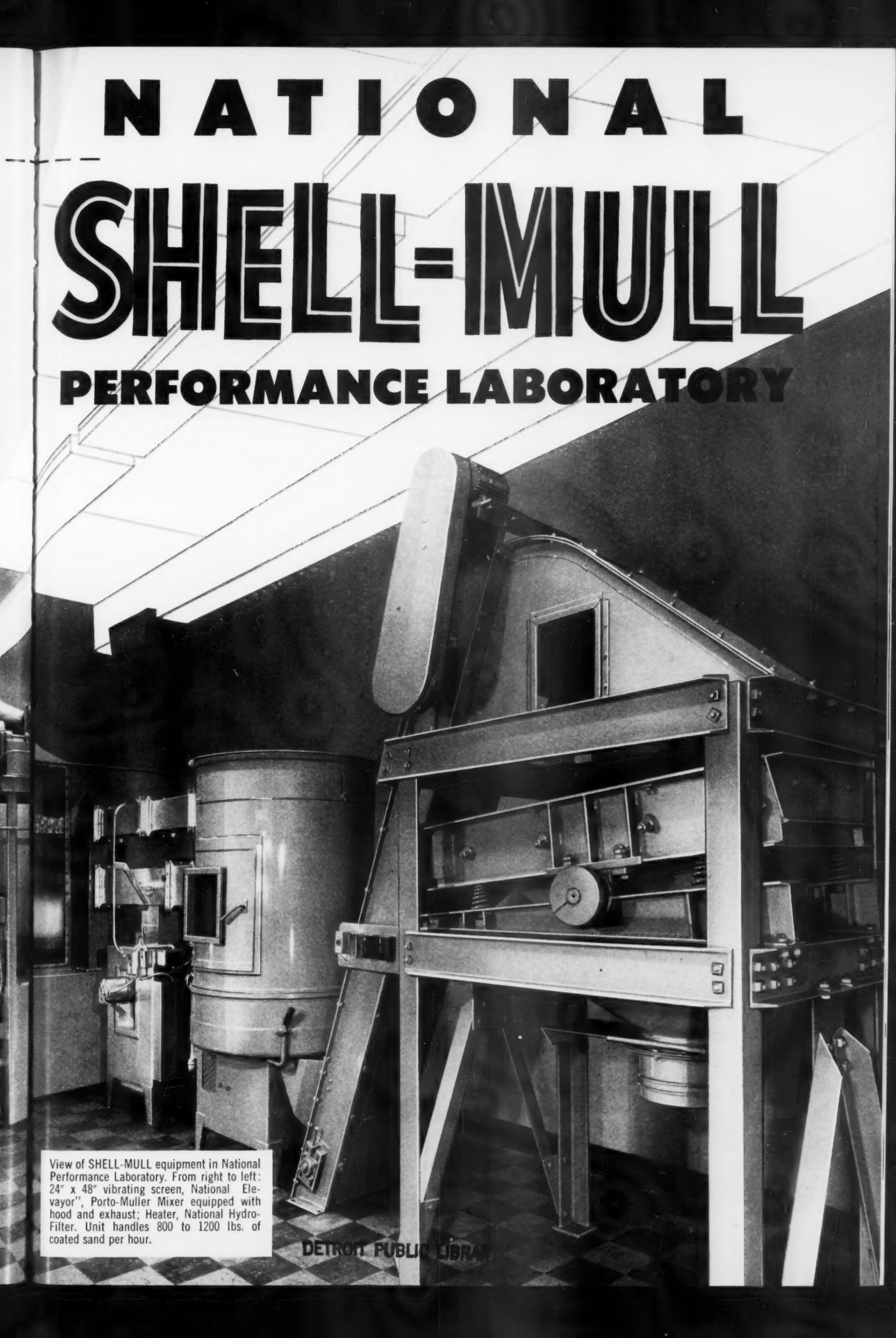
MANUFACTURERS OF SIMPSON MIX-MULLERS

Circle 567 on Inquiry Card—Page 245

NATIONAL

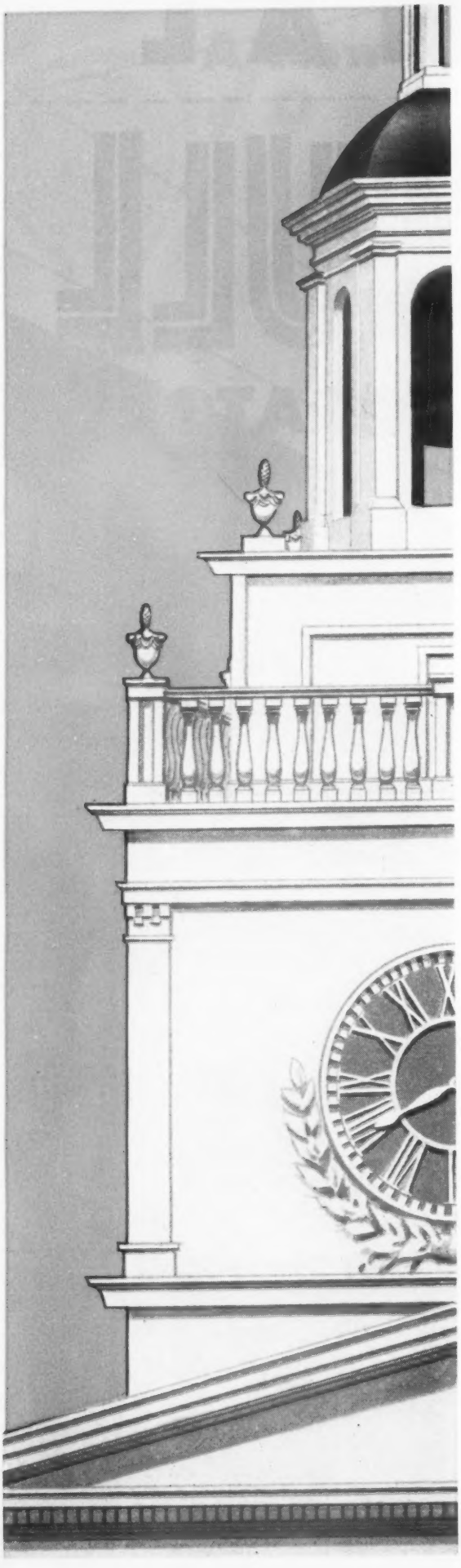
SHELL-MULL

PERFORMANCE LABORATORY



View of SHELL-MULL equipment in National Performance Laboratory. From right to left: 24" x 48" vibrating screen, National Elevayor", Porto-Muller Mixer equipped with hood and exhaust; Heater, National Hydro-Filter. Unit handles 800 to 1200 lbs. of coated sand per hour.

DETROIT PUBLIC LIBRARY



How to

really cut

snagging time

in your cleaning room!

switch to

CINCINNATI

PD

SNAGGING

WHEELS

In towns and cities all across the nation, foundries and plants are ringing out the good news that CINCINNATI (PD)° SNAGGING WHEELS really cut snagging time . . . and thus save money.

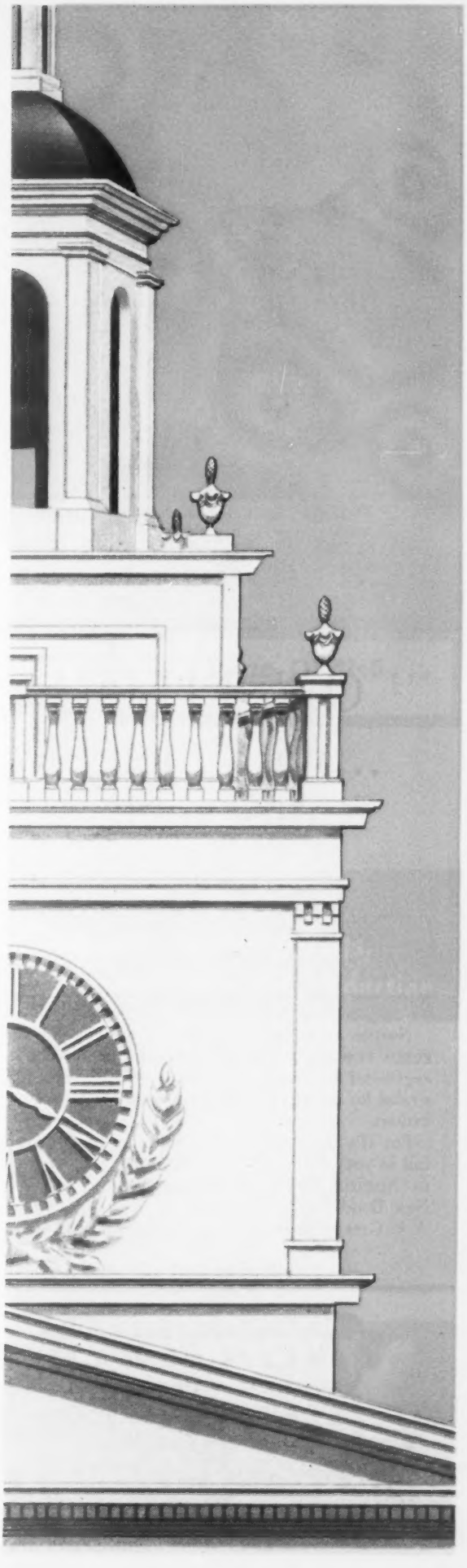
Customers report that their operators like the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS. Specifically, here are some examples of what users in just a few states say:

- MICHIGAN: "FREER CUTTING"—This user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.
- IOWA: "LONGER WHEEL LIFE"—Using a portable grinder, this customer reported almost TWICE THE LIFE with a CINCINNATI (PD) Flared Cup.
- MASSACHUSETTS: "SELF-DRESSING ACTION"—Snagging three types of castings—cast iron, stainless steel and bronze—with a portable grinder, this user reports that CINCINNATI (PD) WHEELS maintain their sharp, rapid cutting action till worn to the safety ring.

Our customers report, too, that POSITIVE DUPLICATION (PD) means another savings. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) WHEELS *are priced no higher than ordinary wheels.* For full details, see your CINCINNATI (PD) GRINDING WHEELS distributor, or contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

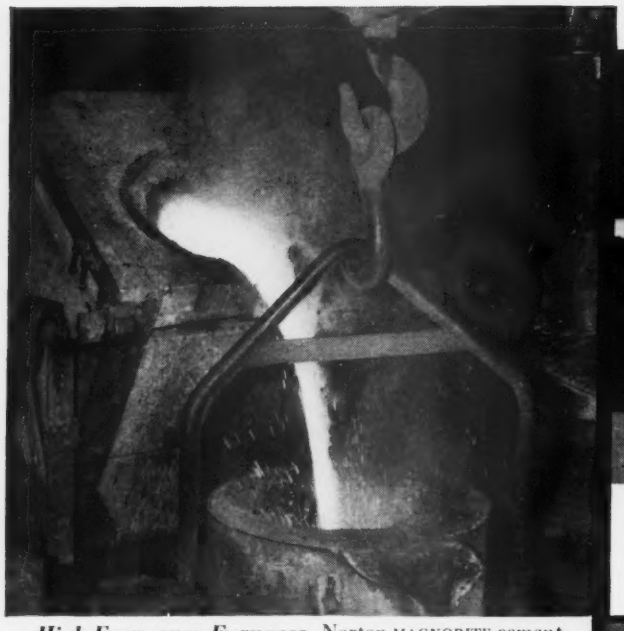
°Trade Mark Reg. U.S. Pat. Off.



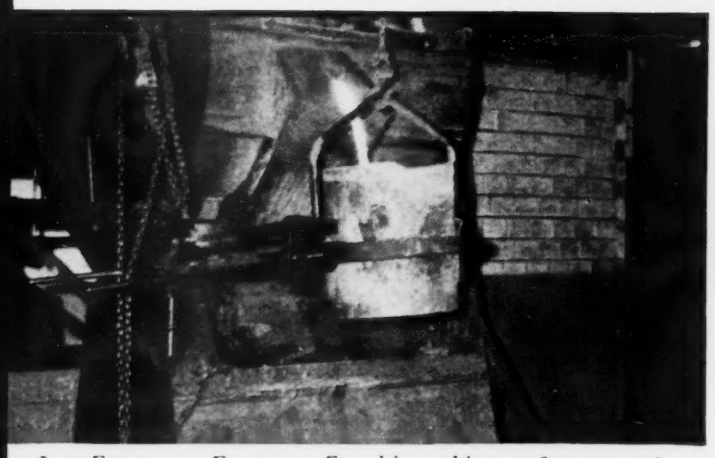
CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

Circle 568 on Inquiry Card—Page 245



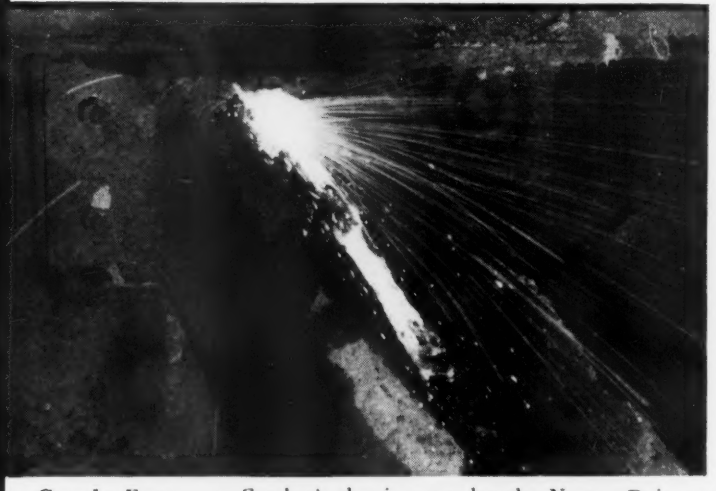
High Frequency Furnaces. Norton MAGNORITE cement is engineered to provide maximum heats per lining. It gives extra long service life at temperatures to 3250°F, its high-rammed density resists metal penetration, erosion and chemical attack, and it is free from shrinkage cracks.



Low Frequency Furnaces. Foundries melting nonferrous metals and malleable iron report longer life from linings of Norton ALUNDUM cement. This high-melting, long-lasting cement is also prescribed for use in holding ladles and desulphurizing ladles.

ON TIME! ...with melt after melt

Norton Refractory Rx's help maintain hot metal schedules, reduce shut-downs, in your furnaces

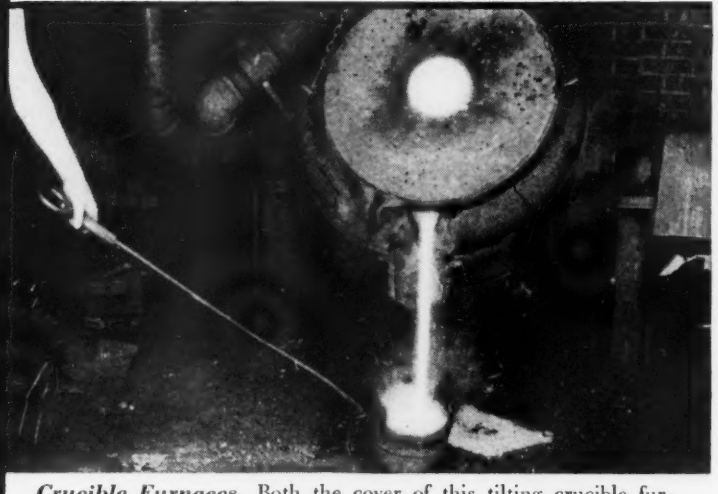


Cupola Furnaces. For back slagging cupolas the Norton Rx is CRYSTOLON slag hole blocks. For capping the notch and lining the slag chute in front slagging cupolas, use CRYSTOLON bricks and cement. CRYSTOLON material is extremely resistant to attack by cupola slags thus providing needed protection in these critical areas.

Norton ALUNDUM*, CRYSTOLON*, MAGNORITE* and FUSED STABILIZED ZIRCONIA refractory materials are *engineered* for longer, lower cost service — and *prescribed* for better processing in many foundry applications.

For Rx's that will improve your own processing call in your Norton Refractories Engineer. Or write to NORTON COMPANY, Refractories Division, 308 New Bond Street, Worcester 6, Mass. *In Canada:* A. P. Green Fire Brick Co., Ltd., Toronto 5, Ontario.

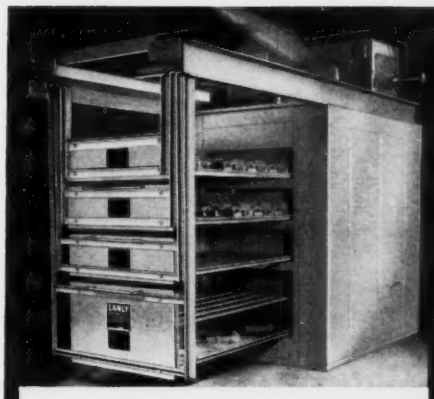
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



Crucible Furnaces. Both the cover of this tilting crucible furnace and its cement lining are made of CRYSTOLON refractory material, engineered for the user's particular needs. CRYSTOLON linings offer effective protection against flame erosion and thermal shock in many different furnace applications.

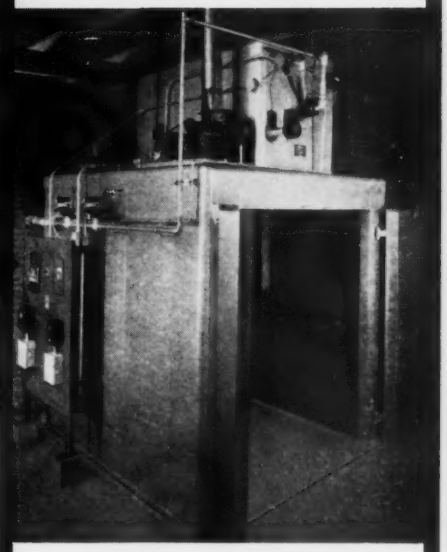
NORTON
REFRACTORIES
Engineered... Rx ...Prescribed
Making better products...to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes



Drawer, . . .

. . . Rack, or



Car Type OVENS . . .

In your Foundry a LANLY Installation . . .

Will aid in . . .

Reducing Fuel Costs, Reducing Handling Costs, Improving Production Quality, Increasing Production

FASTER, BETTER and LESS COSTLY PRODUCTION . . . Time worn words to be sure, but what Foundry today would not welcome this in view of increasing competition, labor costs and more demands upon its facilities.

There is no better time than NOW to examine your production operations.

Check your ovens! Are they fuel eaters, heat losers or core spoilers? Ask the men who operate them!

Chances are you'll find unexpected revelations that will merit a phone call or letter to us.

We'll be pleased to discuss your problems without obligation.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

LANLY FOUNDRY OVENS

THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

WEDRON

A COMPLETE LINE OF 24 DIFFERENT PROCESSED SILICA SANDS

A CONTROLLED GRADE FOR EVERY CASTING NEED!

SAND SPECIFICATIONS — REPRESENTATIVE SCREEN ANALYSES

Unground Sand	4098	4085	4060	4040	4030	4020	5040	5030	5025
Ret on 20 Mesh	2.2								
Thru 20 ret on 30	38.6	12.4	5.6	0.6	0.4	0.4			
Thru 30 ret on 40	57.6	70.8	56.2	37.2	30.2	21.2	4.0	1.2	0.6
Thru 40 ret on 50	1.4	16.3	34.8	52.0	55.8	51.4	34.8	30.4	23.8
Thru 50 ret on 70	0.2	0.5	2.8	9.0	11.4	20.6	44.4	48.2	42.0
Thru 70 ret on 100			0.6	1.0	1.8	5.2	14.4	17.8	26.4
Thru 100 ret on 140				0.2	0.4	1.0	2.0	2.0	6.2
Thru 140 ret on 200						0.2	0.4	0.4	0.8
Thru 200 ret on 270									0.2
Grain Fineness (AFS)	25.88	30.49	33.72	37.48	38.82	42.22	49.96	51.64	56.90

Unground Sand	5015	5010	5005	7030	7020	7010	C-30	C-10
Ret on 20 Mesh								
Thru 20 ret on 30								
Thru 30 ret on 40	1.2	0.4	0.2	0.2	0.2			
Thru 40 ret on 50	15.2	11.2	4.4	3.0	2.4	0.4		
Thru 50 ret on 70	40.2	35.2	31.2	26.2	18.0	8.2	0.4	0.2
Thru 70 ret on 100	35.4	37.4	41.2	42.0	45.0	46.6	28.4	8.4
Thru 100 ret on 140	6.4	10.8	15.4	16.4	20.0	23.2	44.8	50.2
Thru 140 ret on 200	1.2	4.0	5.6	9.6	11.0	15.4	18.8	28.2
Thru 200 ret on 270	0.4	0.8	1.4	1.8	2.4	4.2	5.0	8.8
Thru 270 ret on 325		0.2	0.6	0.8	1.0	2.0	2.6	4.2
Grain Fineness (AFS)	60.20	66.92	73.92	79.36	84.42	95.44	108.22	124.60

Ground Sand (Flour)	80M	100M	140M	200M	300M	325M	400M
Ret on 60 Mesh	10/20%						
Thru 60 ret on 100	25/30%	5%					
Thru 100 ret on 140	15/20%	14%	4%	1%			
Thru 140 ret on 200	10/15%	16%	6%	4%	2%	Trace	
Thru 200 mesh	25/40%						
Thru 200 ret on 270		10%	12%	6%	2%	0.5%	Trace
Thru 270 ret on 325		12%	8%	9%	11%	4.5%	2%
Thru 325 mesh		43%	70%	80%	85%	95.0%	98%

99.9% PURE SILICA WEDRON SILICA COMPANY INDUSTRIAL SAND

FINE SHELL MOLDING SANDS
STANDARD CASTING SANDS — BLASTING SANDS
SILICA FLOUR — LIGHT METAL CASTING GRADES

Wedron offers you a complete line up of casting sands — anything needed for every *casting* need! This means you get the advantages of one source of supply for all the sand you need — sand of the highest quality, too.

Now this Wedron quality stems from two factors. First is the naturally rounded grain sand of the Ottawa-Wedron district (this is held to be one of the purest silica sand deposits in the nation). Second is the modern, completely equipped Wedron plant, which turns out a superior silica product and makes all grades available.

Look to Wedron for the *complete* line of quality casting sands.

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

135 SOUTH LASALLE STREET, CHICAGO 3, ILLINOIS

Engineering in Action

...BACKED UP *three deep*

with parts and service—when you use

Allis-Chalmers FORK TRUCKS

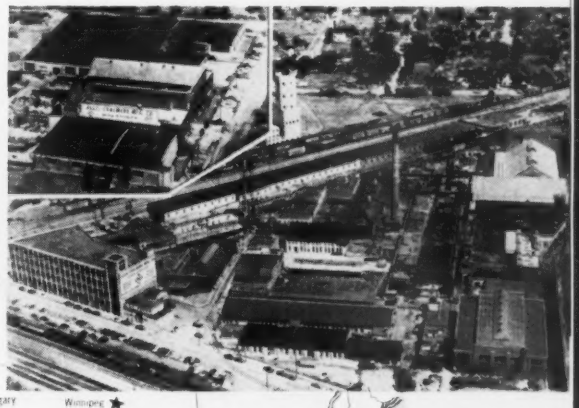
You enjoy almost "Factory-town" service wherever you are when you operate Allis-Chalmers Fork Trucks — for you are backed up *three deep* by Allis-Chalmers' highly successful dealer-branch-factory system.

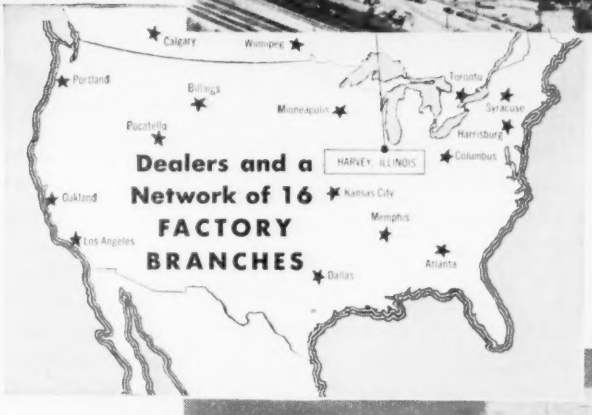
What does this mean? It means that your dealer is serviced directly from a nearby factory branch — *one of 16*. Each branch carries a full stock of True Original Parts and is staffed with factory-trained servicemen as well as sales engineers. This assures prompt attention whether you need a replacement part or technical advice.

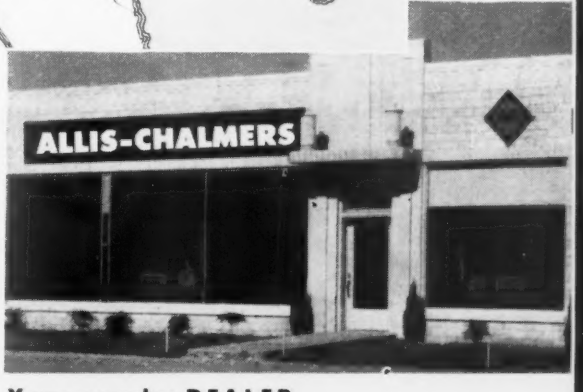
Ask your Allis-Chalmers material handling dealer to show you how Engineering in Action with this *three-deep* service can help on *your* specific job. Write for literature and details.

MATERIAL HANDLING DEPT., BUDA DIVISION, MILWAUKEE 1, WISCONSIN

Strategically located FACTORY





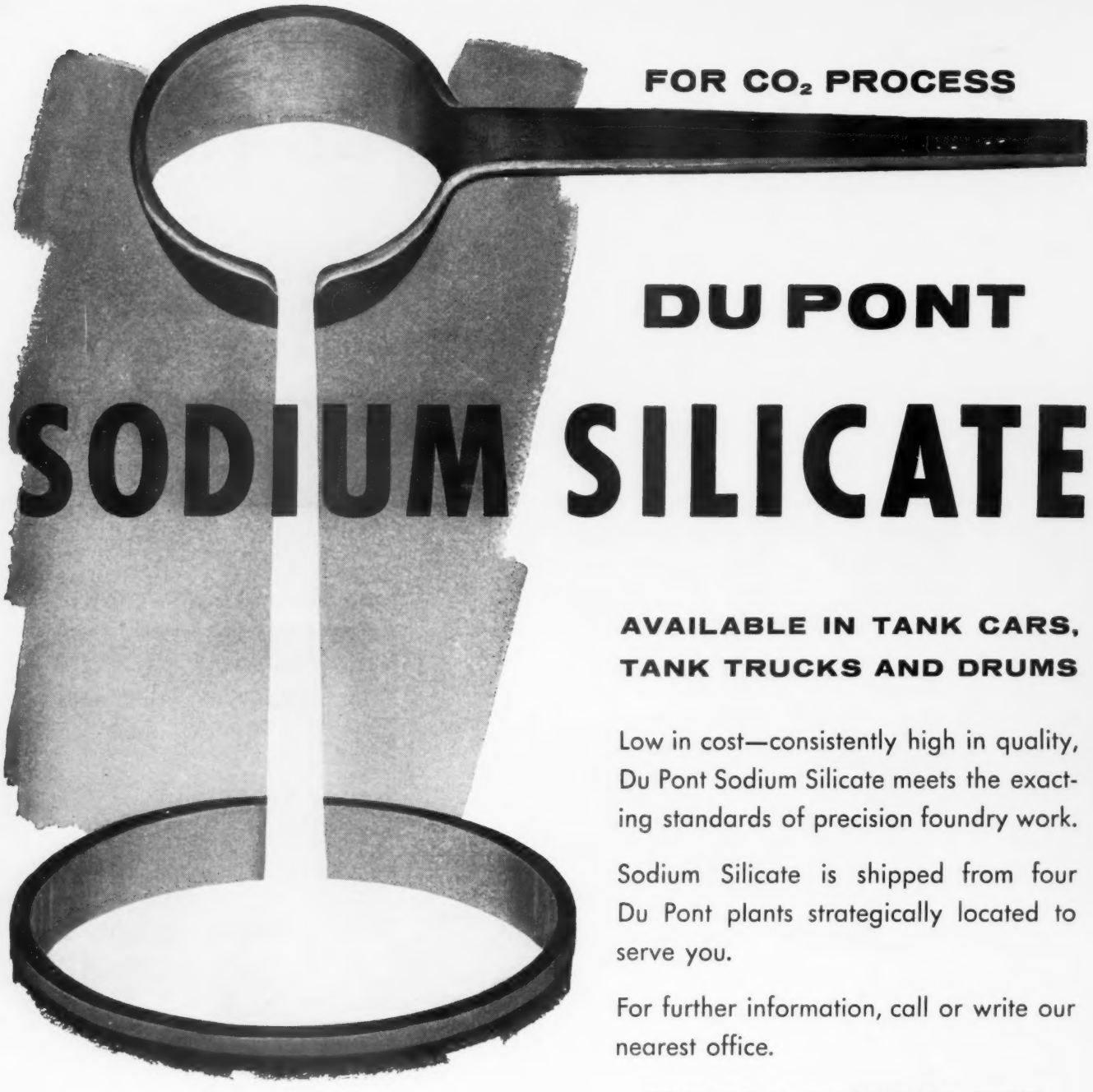


Your nearby DEALER

ALLIS-CHALMERS

Circle 572 on Inquiry Card—Page 245

BH-21



FOR CO_2 PROCESS

DU PONT SODIUM SILICATE

AVAILABLE IN TANK CARS, TANK TRUCKS AND DRUMS

Low in cost—consistently high in quality, Du Pont Sodium Silicate meets the exacting standards of precision foundry work.

Sodium Silicate is shipped from four Du Pont plants strategically located to serve you.

For further information, call or write our nearest office.

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E. I. du Pont de Nemours & Co. (Inc.)
Wilmington 98, Delaware

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Cincinnati 2, Ohio	603 Terrace Plaza Bldg.
Cleveland 14, Ohio	1321 Natl. City Bank Bldg.
Detroit 35, Mich.	13000 West 7 Mile Road
Houston 25, Texas	1100 E. Holcombe Blvd.
Milwaukee 13, Wisc.	6500 West State Street
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New Haven 13, Conn.	46 River Street
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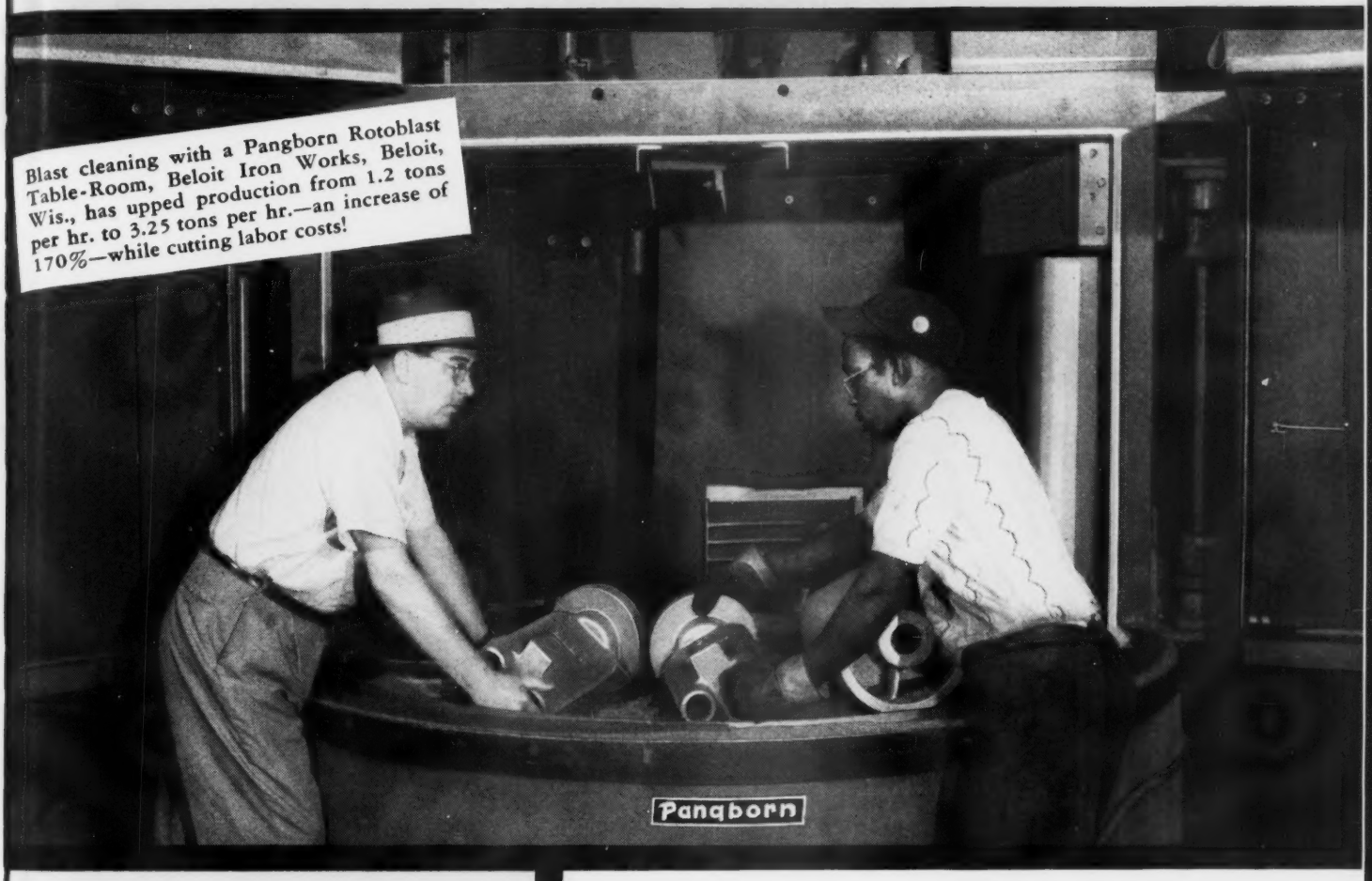
Pittsburgh 19, Pa.	1715 Grant Bldg.
St. Louis 7, Mo.	112 West Ferry Street

In Canada: Du Pont Company of Canada Limited, Box 660, Montreal, P. Q., Canada

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Pangborn Rotoblast® speeds production at Beloit Iron Works!



Blast cleaning with a Pangborn Rotoblast Table-Room, Beloit Iron Works, Beloit, Wis., has upped production from 1.2 tons per hr. to 3.25 tons per hr.—an increase of 170%—while cutting labor costs!

And at Link-Belt, too!

Faster cleaning with Blastmaster Rotoblast Barrel at Olney Foundry Division, Link-Belt Company, Philadelphia, has stepped up production 20% to 25%!

Tables, rooms, barrels—whichever blast cleaning machine best fills your cleaning needs, Pangborn Rotoblast will speed *your* production.

Pangborn Rotoblast cuts operating time by cleaning *quickly,* throwing a heavy volume of abrasive over a large surface area. The result is higher production and, therefore, lower cleaning costs. Add the "plus" benefits of reduced labor costs and better cleaning quality and we think you'll agree Pangborn Rotoblast is worth investigating. Take a few seconds now to send for more information—it can save you thousands of dollars later.

Write for Bulletin 227 to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Visit our Booth 8 to 12, Iron & Steel Exposition, Cleveland, September 25 to 28

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Distributors for Malleabrasive and Tru-Steel Abrasives 1B

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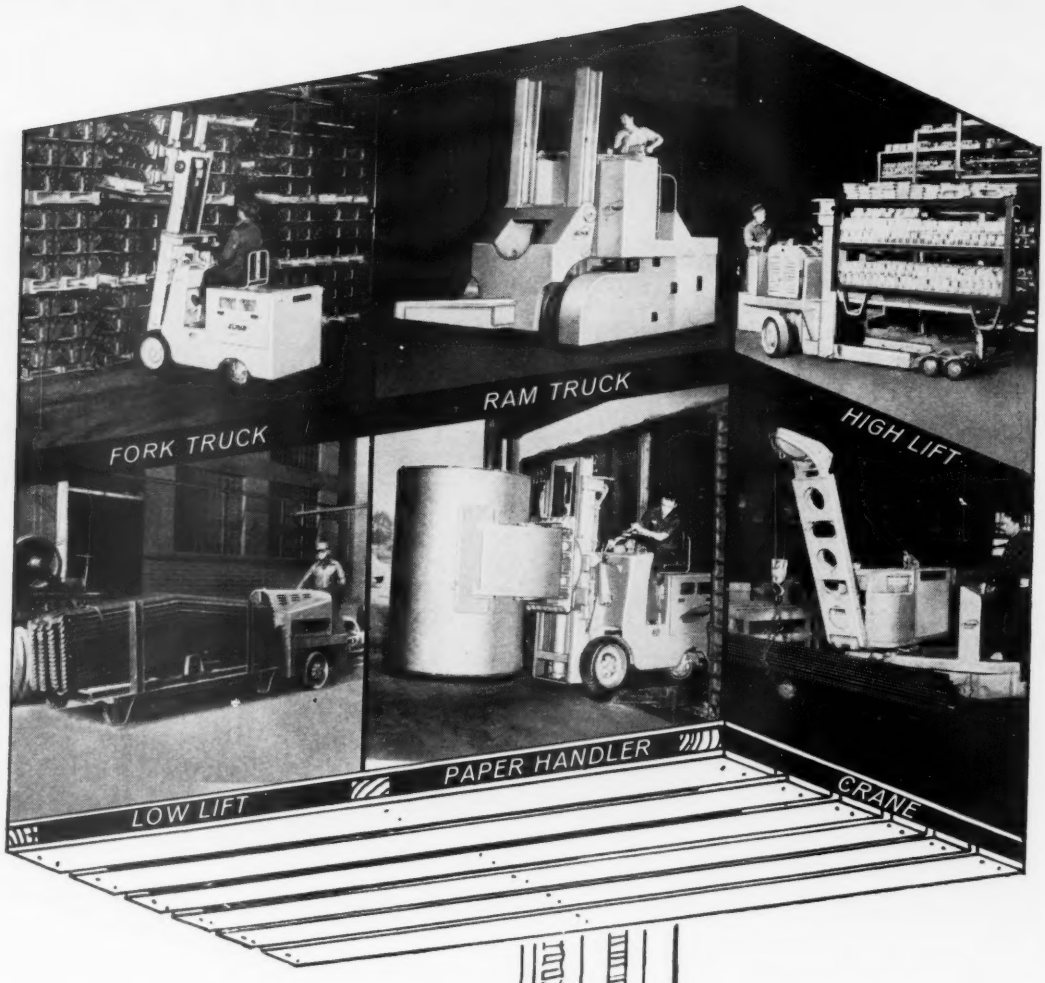


ELPAR trucks meet EVERY need

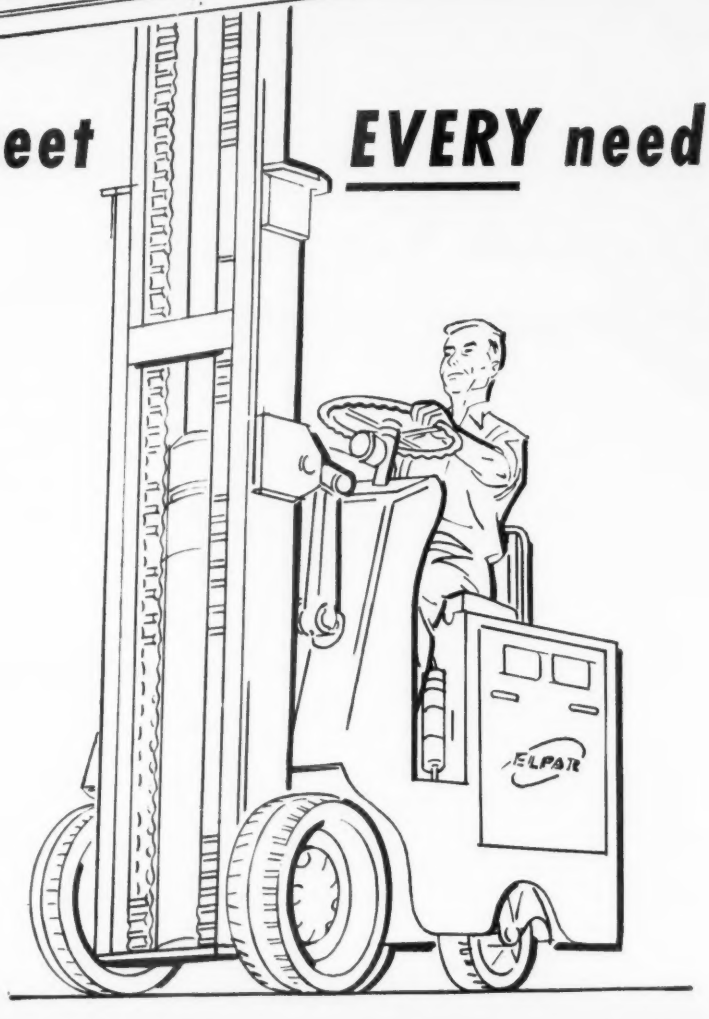
because Elwell-Parker:

FURNISHES *ALL* TYPES—Elwell-Parker produces not one or two basic trucks, but *every* type needed to solve varying materials handling problems. There are E-P low lift platforms and high lift platform trucks, fork trucks, and mobile cranes . . . available in over 100 different sizes and capacities.

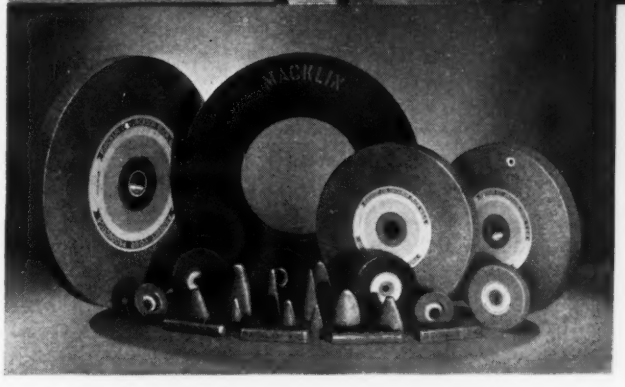
ENGINEERS "SPECIALS"—Not infrequently, the unusual shape or nature of the load requires a *specially designed* truck. Elwell-Parker has pioneered in this field—cutting costs for hundreds of industrial firms where standard trucks will not suffice.

NEW GENERAL CATALOG—*describes the complete line. Send for your copy now.*

THE ELWELL-PARKER ELECTRIC CO.
4316 St. Clair Avenue • Cleveland 3, Ohio



MACKLIN



Macklin manufactures a complete line of foundry wheels designed to "spark the production" in your cleaning room. Specify Macklin Wheels on your next job. A trial will convince you.

HOW TO SNAG MORE METAL PER HOUR AND GET LONGER WHEEL LIFE TOO!

● Today, every day, leading foundries are rating Macklin's new improved B-5 bond *tops* for snagging operations requiring fast, cool cutting and heavy stock removal. Jobs like grinding fins and gates from cast iron, annealed malleable, and steel castings.

Results like these are the reason:

Product		Wheel Life	Stock Ground Over the Wheel
Malleable Castings	MACKLIN	24.1 hours	17.04 tons
	Wheel B	18 hours	12.76 tons
1030-1040 Steel Castings	MACKLIN	57 hours	35 tons
	Wheel C	40 hours	25 tons

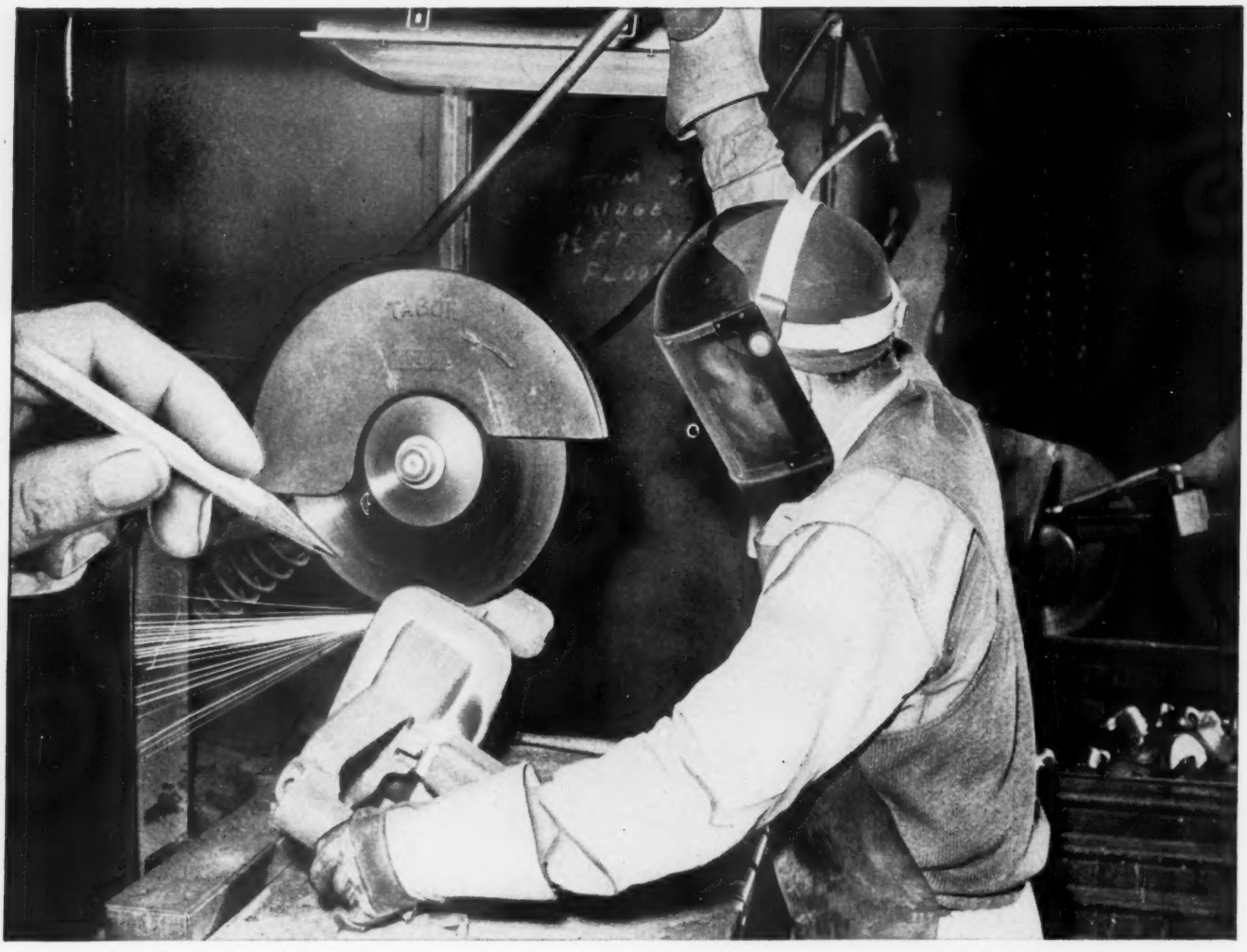
IT TAKES LOTS OF RESEARCH AND TESTING to develop any new Macklin Wheel. As much as is required for any other precision tool. And after the research, engineering and testing are complete, Macklin wheels are produced in one of the most modern plants in the industry, where you're assured of controlled formulation and accurate duplication.

TRY A MACKLIN SNAGGING WHEEL ON YOUR JOB
Your *Macklin Salesman or distributor* will be glad to demonstrate, show you how to save time . . . wheels . . . and dollars. You'll find him listed under "abrasives" or "grinding wheels" in the yellow pages of your directory. Or, if you prefer, write direct.

MACKLIN company
Dept. 22

JACKSON, MICHIGAN

Circle 576 on Inquiry Card—Page 245



This MANHATTAN Cut-Off Wheel is Reinforced for Safer, Faster Foundry Cutting

Only with correct *built-in* reinforcement can a cut-off wheel take the abuse and excessive strain of heavy cutting in foundry operations. Manhattan Reinforced Cut-Off Wheels are reinforced two ways. First, the use of special fibers in the bond increases by 50% the strength of the wheel to withstand destruction by centrifugal force. In addition, special super-strength synthetics fabric lateral reinforcement gives Manhattan Reinforced Cut-Off Wheels resistance to side strain far beyond the ability of conventional cut-off wheels.

Actual field reports indicate up to 25% increase in cutting efficiency and cleaning-room production with these wheels . . . on both stationary and swing-frame cut-off machines. They give a degree of protection against breakage and other operational hazards which virtually eliminates cut-off wheel failures. Ask your Manhattan representative to show you how to get safer, faster cutting and increased production . . . "More Use per Dollar" . . . with Manhattan Reinforced Foundry Cut-Off Wheels and other types of high speed, heavy duty wheels.

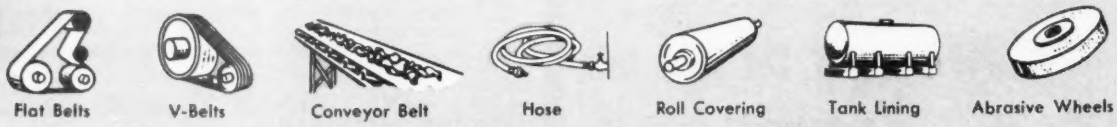
RM 639

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Flat Belts | V-Belts | Conveyor Belt | Hose | Roll Covering | Tank Lining | Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

IF YOU MOVE MATERIALS... YOU *NEED* A HYSTER INDUSTRIAL TRUCK

LP-Gas equipped Hyster 80 moves cast items between departments. "City Street and Yard Operations" is no problem for this inside-outside lift truck.

Pictured above is one of many typical examples of how Hyster® Industrial Trucks are helping to effect tremendous savings in the cost of materials handling in Foundries.

Even if you are now using lift trucks or have never used industrial trucks of any kind, your Hyster dealer can show you how you can quickly realize more profit from your operation with these multi-purpose utility tools. Your Hyster dealer knows materials handling . . . he is an expert on the problems and their solution. He can help you with special techniques and cost reducing methods. Call him today...why not take advantage of his materials handling know-how? He is listed under "Trucks-Industrial" in your telephone directory.

HYSTER DEALERS GIVE YOU ALL 3!

1 **PLANNING**—your Hyster Dealer will plan your materials handling operation from scratch, or will analyze your present system to see if it can be improved.

2 **THE RIGHT TRUCK** — for your job from Hyster's complete line of industrial trucks (1,000-30,000 lbs.) and over 100 job-attachments for economical load handling.

3 **THE RIGHT SERVICE** — ample spare parts stock, shop facilities, factory-trained mechanics and an efficient field service that keep your Hyster lift trucks going on your job, wherever your job might be located. Hyster trucks are noted the world over for their low downtime.

Materials Handling Trucks from 1,000 to 30,000 pound capacities

2902-30 N. E. CLACKAMAS, PORTLAND 8, OREGON
1010-30 MYERS STREET.....DANVILLE, ILLINOIS
HYSTER N.V.....NIJMEGEN, THE NETHERLANDS
FOUR FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands.

HYSTER

HYSTER COMPANY

synthetic resins

CO_2 sand (WITH CORRECT PERMEABILITY)

facing sand (FOR GREEN TOPPING CORES)

oil sand

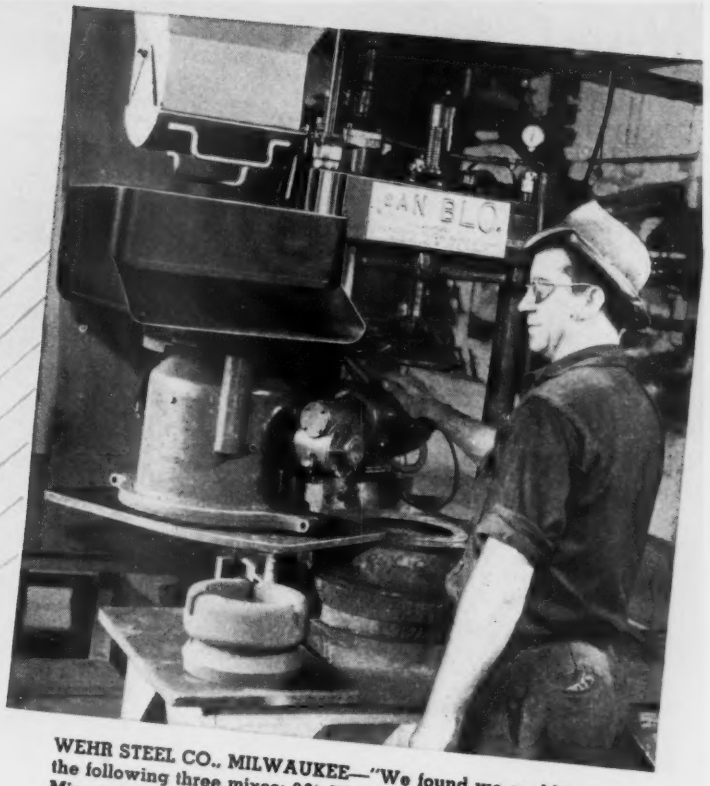
pitch and cereal

with working moistures ranging up to 8% and proper green bond strength for individual requirements...

all are being blown on SAN-BLO machines

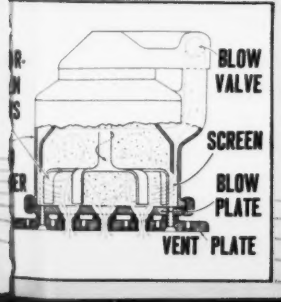
Manufactured by *San-Blo Division*

ATLANTIC FOUNDRY CO., AKRON—"Core mixture, for sprocket cores being blown on our San-Blo, tests 5.5% moisture, 3.7 lbs. green strength, and 60 permeability. We also found we could blow our runner cups."

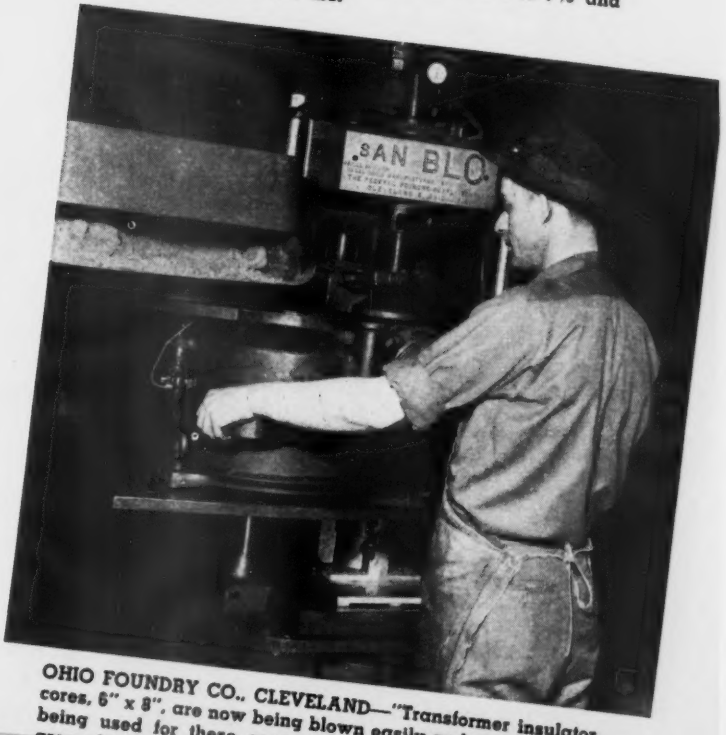


WEHR STEEL CO., MILWAUKEE—"We found we could blow the following three mixes: 3% Woodflour Mix, 4% Dry Binder Mix and 30% Silica Flour Mix. Moisture from 4 to 7% and green strength from 3 to 7 lbs."

The SAN-BLO can blow these non-flowable core mixtures because motor-driven plows in its blow head move sand mechanically to the blow hole. Air is used only to aerate sand in the lower part of the blow head and convey it into the core box. Follow the green arrows and you'll see how air enters the blow head, fluffs up the sand as the plows move it toward the blow hole, and finally picks up the sand, at full pressure, to carry it quickly into the core box.



You, too, can blow non-flowable mixtures, but only with a SAN-BLO!



OHIO FOUNDRY CO., CLEVELAND—"Transformer insulator cores, 6" x 8", are now being blown easily and rapidly. Sand being used for these cores tests 8% moisture and 6 lbs. green bond strength."

The FEDERAL FOUNDRY SUPPLY Company
4600 EAST 71st STREET, CLEVELAND 5, OHIO
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

Now! Available at last.....

MOROC

A CONTROLLED SILICATE CO_2 BINDER

Check these advantages:

1. Controlled from point of origination.
2. No separation of bond in storage.
3. Low viscosity permits easy mixing.
4. Faster gas reaction.
5. Permits small cores to be oven dried. (Curing time, 5 to 25 minutes @ 400° F.)
6. Good storage life of finished cores.
7. Good collapsibility.
8. Superior dimensional accuracy.
9. Low gas evolution.
10. Small investment "gets you started." No BIG outlay for equipment.

DISTRIBUTORS:

For full details on MOROC, write or phone us direct or consult one of our distributors:

A. T. Wagner Co.
2720 Wight, Detroit

Springfield Facing Co.
401 S. 2nd., Harrison, N. J.

Osman Foundry Sands
8621 Ramsgate Ave., Los Angeles

MOROC is distributed exclusively by the Delhi Foundry Sand Co., and produced by the Diamond Alkali Co.

This new development is a result of cooperative research conducted by Diamond Alkali Co., Cleveland, and the Delhi Foundry Sand Co., Cincinnati. Material and method have already been proven under actual operating conditions. Large ferrous and nonferrous castings, medium to large cores, and generally any core, whether hand made or blown, can be produced with MOROC. Remember MOROC: it is the binder of the FUTURE, but it is here TODAY. If you have any questions about the process, we'll be glad to answer them.

THE DELHI FOUNDRY SAND CO.

Miners and shippers of all grades of fluorspar. Complete line of foundry sands, clays and bentonites
6326 GRACELY DR., CINCINNATI 33, OHIO
PHONE: WILLOW 1-2600

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Late News

COSTS GO UP: Paced by the skyrocketing in ferrous scrap, prices of foundry raw materials have risen on a broad front since the end of the steel strike. Coke is up $2 at a number of centers. The recent increase of $2.50 in pig iron raises that market to $4 above the level a year ago, $10 higher than five years ago. Primary aluminum and magnesium have been advanced 1 to 1½ cents a pound. Brass, bronze and secondary aluminum ingot have edged upward.

SCRAP SOARS: Scrap has been the most spectacular performer pricewise the last few weeks. The surge carried steelmaking grades this week to the highest level in history. Railroad specialties and short steel rails are bringing 42 per cent more than they were a year ago. The rise in cast grades has been more moderate—about 15 per cent.

EXPORTS A FACTOR: Prospects for an extended busy period for steel mills have sparked the scrap price rise, but heavy export demand is a factor. On the West Coast, diversion of scrap to overseas is blamed for creating a critical situation for foundries—a condition sufficiently serious that the Department of Commerce was persuaded to investigate. At Los Angeles some gray iron foundries are reported to have closed down for a few days at a time because of a lack of scrap. Although early this year it was predicted that scrap exports would taper from the 5-million-ton pace of 1955, shipments have been running 10 per cent ahead of last year's rate.

CASTING SHIPMENTS: Foundry operations as a whole have held up well so far this year, considering the 30 per cent drop in passenger car production. Shipments of all castings in the first half were down only about 5 per cent from the like 1955 period. During the six months steel casting shipments rose 45 per cent, magnesium deliveries were up 25 per cent and brass and bronze foundries scored a 10 per cent gain. Other types of castings showed slight to moderate losses. With prospects for the remainder of the year relatively bright, 1956 shipments likely will come close to the nearly 19-million-ton total for 1955, second best year in history.

FOUNDRY CONSTRUCTION: Griffin Wheel Co. has contracted with H. K. Ferguson Co. for construction of a 130 x 602-ft foundry building costing $900,000 to be built at Colton, Calif. Chevrolet Division of General Motors plans a million-dollar expenditure on its Tonawanda, N. Y., foundry. Incorporating a new building and larger melting capacity, the program is intended to meet production requirements for 1958 cars.

TO WASHINGTON: Clyde B. Jenni is the new chief of the Castings Branch, Iron and Steel Division, Business and Defense Services Administration. On leave from General Steel Castings Co., Eddystone, Pa., where he is chief metallurgist, he succeeds Roger F. Waindle, president, WaiMet Engineering Co.

ACQUIRES FOUNDRY: Harry L. Quinn, recently treasurer and general manager, Lebanon Steel Foundry, Lebanon, Pa., has bought the Donegal Mfg. Corp., Marietta, Pa., and now is its president. The company makes carbon, low alloy and stainless steel castings.

TITANIUM EXPANSION: Titanium Metals Corp. of America is expanding its plant capacity at Henderson, Nev. Output of sponge will be increased 50 per cent to 9000 tons annually and ingot producing facilities will be expanded 80 per cent to 11,000 tons a year.

PERSONALS: J. S. Moroso has been appointed assistant to the general sales manager, Electro Metallurgical Co. . . . Robert L. Hudson has been promoted to superintendent, gray iron finishing department, Central Foundry Divi-

sion, GMC, Danville, Ill. . . . James E. Allegro has been appointed general manager, Hempfield Foundries Co., South Greensburg, Pa. . . . Forest G. Boucher, formerly with Penn Scott Foundries Inc., Scottdale, Pa., has been named operations manager, Shallway Corp., Connellsville, Pa.

FOUNDRY COURSE: A free practical course in foundry practice is being offered by the New York Board of Education at the Machine & Metal Evening Trade School. The course will be held Monday and Wednesday evenings for 25 or 50 evenings. Applicants may register Sept. 10-11 from 7 to 9 p.m.

MEETINGS: Investment Casting Institute has set Nov. 13-15 as dates for its fourth annual meeting, to be held at the Sheraton-Cadillac, Detroit . . . American Foundrymen's Society's 1957 annual convention, to be held in Cincinnati, May 6-10, will include an exhibit of engineered castings. Foundries, pattern shops, suppliers of metals, and manufacturers of laboratory, inspection and quality control equipment will be elegible to exhibit their products. The next full-scale AFS exhibit of foundry equipment and supplies will be held May 22-28, 1958, in Cleveland.

OBITUARY: Martin A. Dooley, 67, vice president and secretary, Sterling Wheelbarrow Co., and a director, Lawran Foundry Co., both of Milwaukee, died Aug. 20 in Paris . . . Henry A. Saller, recently appointed an assistant technical director, Battelle Memorial Institute, Colmbus, O., died Aug. 14 . . . Milton J. Rice, 54, vice president in charge of engineering, Whiting Corp., Harvey, Ill., died Aug. 11.

MISCELLANY: Rimer Precision Casting Co. has been formed with offices and plant at Waterville, O. R. M. Rimer is president . . . J. S. McCormick Co., foundry supplies company, has purchased property adjacent to its Pittsburgh plant for expansion purposes . . . Southern Casting Co., Sevierville, Tenn., has disposed of its Toledo, O., plant, which was operated as Daney Casting Co. . . . West Way Pattern Works, Cleveland 9, has incorporated and changed its name to West Way Pattern & Mfg. Co.

Prices of Foundry Metals and Coke

(As of Aug. 27, 1956)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.00-18.00
OVEN	
Birmingham	$27.60
Buffalo	27.50
Detroit	27.50
Erie, Pa.	27.50
Indianapolis	28.75
Kearny, N. J.	28.75
Lone Star, Tex.	19.50
Milwaukee	29.50
Montreal, Que.	28.50
Neville Island (Pittsburgh)	28.25
New England, deld.	28.55
Painesville, O.	29.50
Philadelphia	28.50
St. Louis	28.50
St. Paul	28.50
Swedeland, Pa.	26.50
Terre Haute, Ind.	28.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$65.00	$65.50
Birmingham	59.00	63.00
Buffalo	63.00	63.50
Chicago	63.00	63.00
Cleveland	63.00	63.00
Duluth	63.00	63.00
Erie, Pa.	63.00	63.00
Everett, Mass.	63.75	64.25
Fontana, Calif.	70.50	....
Geneva, Utah	63.00	....
Granite City, Ill.	62.40	62.90
Lone Star, Tex.	55.00	....
Neville Island (Pittsburgh)	63.00	63.00
Steelton, Pa.	65.00	65.50
Swedeland, Pa.	65.00	65.50
Toledo, O.	63.00	63.00
Troy, N. Y.	65.00	65.50
Youngstown, O,	....	63.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 37.55; tin bronze, No. 225, 48.00; No. 245, 43.50; high-leaded tin bronze, No. 305, 41.00; No. 1 yellow, No. 405, 29.75; manganese bronze, No. 421, 33.00.

ALUMINUM: 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 26.50-27.00. Deoxidizing grades: No. 1 27.00; No. 4 25.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 40.00 delivered Connecticut valley.

ZINC: High grade 14.85 delivered. Die casting alloy No. 3, 18.00, No. 2, 19.00, delivered.

IRON AND STEEL SCRAP

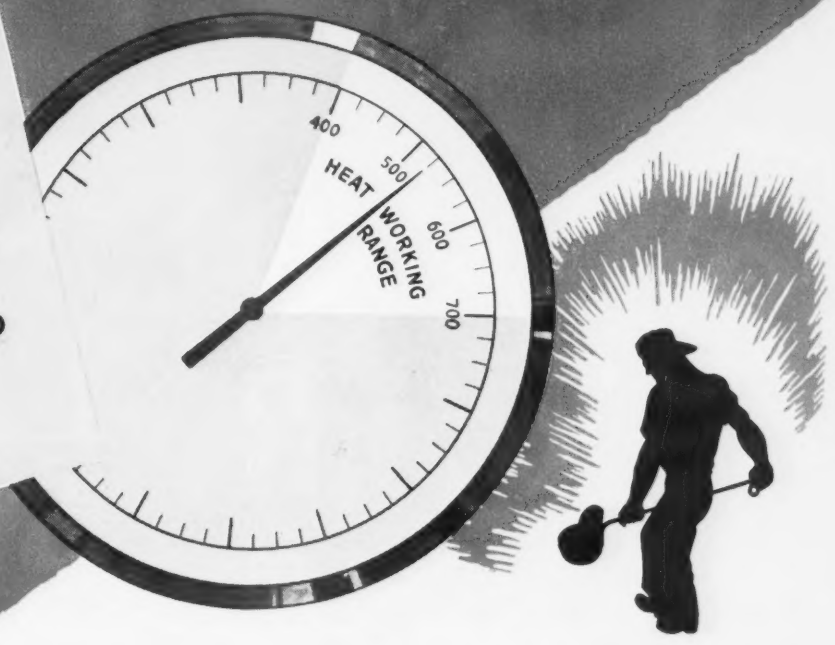
(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$42.00-43.00	**$51.00-52.00	.....	.....	.....	.....	$65.00-66.00
Boston*	**51.00-51.50	**43.00-43.50	.....	.....	44.50-45.00	.....	.....
Buffalo	56.00-57.00	**47.00-48.00	.....	.....	**53.00-54.00	.....	64.00-65.00
Chicago	58.00-60.00	53.00-54.00	.....	57.00-58.00	57.00-58.00	71.00-72.00	80.00-82.00
Cincinnati*	**54.50-55.50	**46.00-47.00	**46.00-47.00	.....	**57.00-58.00	.....	**74.00-75.00
Cleveland	61.50-62.50	56.00-57.00	48.00-49.00	56.00-57.00	58.00-59.00	70.00-71.00	80.00-83.00
Detroit*	**54.00	**48.00	.....	**53.00	.....	**52.00	.....
Los Angeles	44.00	**50.00	.....	.....	.....	.....	.....
New York*	52.00	46.00-47.00	46.00-47.00	.....	.....	.....	.....
Philadelphia	58.00	52.00-53.00	55.00	.....	58.00	68.00	72.00-73.00
Pittsburgh	57.00-58.00	51.00-52.00	48.00-49.00	.....	56.00-57.00	.....	75.00-77.00
St. Louis*	48.00	50.00	42.00	50.00	.....	.....	72.00
San Francisco	46.00	52.00	42.00	52.00	52.00	.....	.....
Seattle	46.00	45.00-47.00	40.00-42.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Whitehead's NEW DUO RESIN* BINDER

● with controlled oven temperature you can profit by the advantages of our latest lab development.



After three years of laboratory research and field testing, Whitehead is now ready to supply DUO RESIN Binder to progressive foundries for dry sand molding. It is a laboratory controlled product designed to replace pitch. DUO RESIN Binder affords all the desirable properties of pitch; in addition, it gives a consistently strong bond and offers the following highly desired advantages:

1. **EASY SHAKEOUT** — DUO RESIN Binder makes shakeout easy because it burns out while metal is cooling.
2. **BETTER CASTING FINISH** — Permits full benefit of blacking penetration since it does not waterproof sand.
3. **ECONOMICAL** — Promotes economy by saving up to 50% of dry binder, requiring less handling, less storage, less transportation. Takes lower baking temperatures, saving fuel, too.
4. **SIMPLIFIES OPERATION** — Because it eliminates need of blending with other compounds to achieve the desired results.
5. **NON-IRRITATING** — Of bland chemical composition, DUO RESIN is non-irritating.
6. **TESTED AND PROVED** — It has been tested and proved safe in foundry after foundry.

Try DUO RESIN Binder!
Order a trial quantity today.

****For details ask for literature or consult our representative.***

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

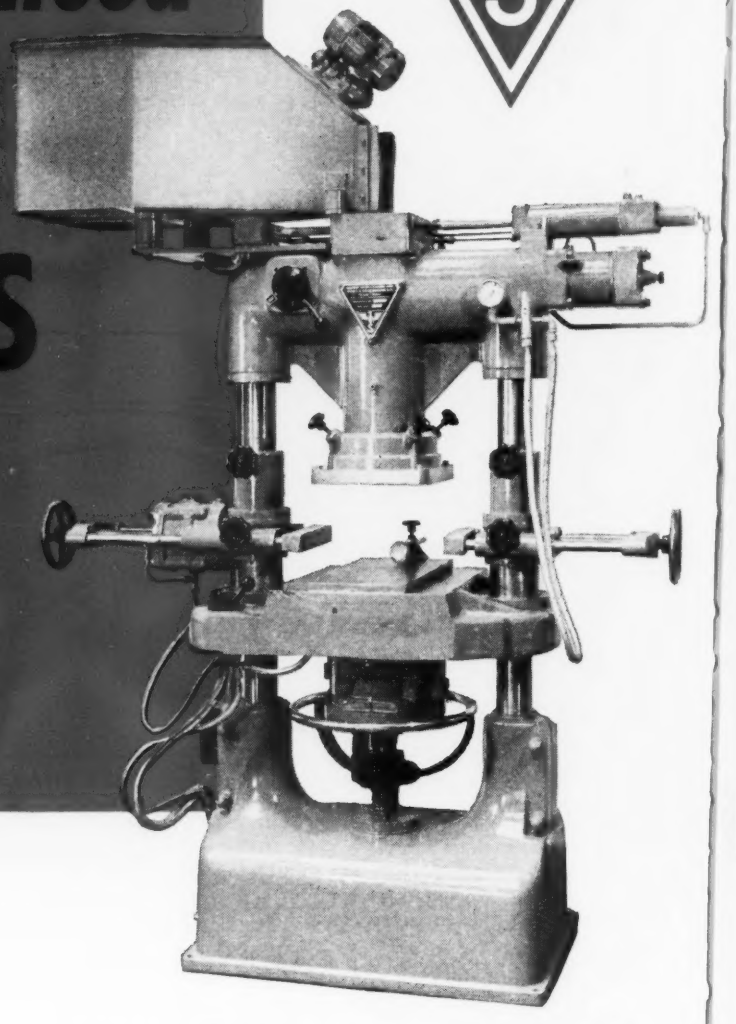
Next Page Circle 582→

Team-Mates

Everything you need for the CO_2 PROCESS

CARVER

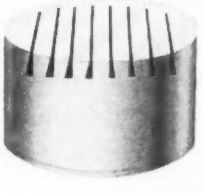
FOUNDRY PRODUCTS CO.



Carver Foundry Products is the most experienced organization in the U.S.A. on the CO_2 Process. Carver engineers are available to help you in all phases of this fabulous process for hardening cores and molds in a matter of seconds.

If you are now using this process, or plan to use it, let us serve you on all your requirements. If you do not use it let us tell you about its many important advantages.

KRAUSS *Self-Cleaning, Taper-Slot* CORE VENTS



The slots diverge toward the underface, preventing fine particles of sand from clogging slots, eliminating the necessity for frequent cleaning. Continuous producton assured. Krauss Core Vents are widely used for the CO_2 Process.

FORMLAC CORE and MOLD WASH

puts a hard coat on CO_2 cores that makes core handling safe. High refractory properties assure against burning in *any size casting*. Wonderful to stiffen up long delicate and thin cores. FORMLAC is excellent also for green sand molds and cores.

CARVER FOUNDRY PRODUCTS CO.
1060 Hershey Ave., Muscatine, Iowa

- ☐ Send a copy of Handbook on the CO_2 Process.
- ☐ Have a CO_2 Process Engineer call.
- ☐ I am interested in literature on _____

NAME _____ **TITLE** _____

COMPANY _____

ADDRESS _____

CITY _____ **ZONE** ____ **STATE** _____

CARVER

For Lightning Fast Production

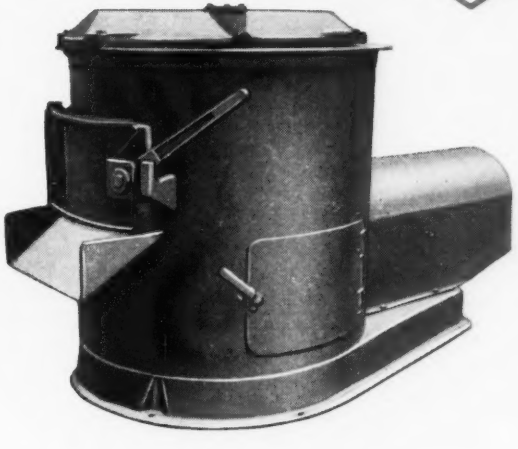
V + S Core Shooters

. . . world's fastest core making machine! Revolutionary new technique. • Extremely high green strength "stand up" cores can be made with any binder. • Negligible wear on wood boxes. • Very little air is used. • Economical for large or short runs. • Core boxes can be changed in one minute. • V + S Core Shooters available in 4 sizes of varying capacities.

Automatic Gassing Apparatus

Ideal team-mate for the V + S Core Shooter. Insures amazing speed in core hardening. *CORES MAY BE HARDENED THROUGH AND THROUGH IN 3 SECONDS.* Savings in CO_2 gas and labor pay for machine in a matter of weeks. Machine is 100% automatic.

V + S Rapid Sand Mixer



MOST POPULAR AND EFFICIENT MIXER IN THE WORLD — OVER 3000 IN OPERATION. Simple in design and operation — virtually maintenance free. Easy to clean. Less binder used because of higher mixing efficiently. Easier and faster to load and unload.

STEINEX

STEINEX . . .

the original CO_2 sand binder, is the standard of Quality *and comparison* throughout the world. Hardens fast, produces harder cores, less gas evolution and shakes out better. No other binder can compare with it in quality. *Made in several special grades to save our customers money and improve quality!*

Complete Suppliers for the CO_2 Process

FOUNDRY PRODUCTS CO., Muscatine, Iowa

For more information, use Reader Service Card, page 245

This new service .....

Makes it easy for you to request literature or more information on equipment and products described in this issue of FOUNDRY.

You will observe that all new product descriptions and helpful literature reviews are identified with numbers --- you merely circle the numbers listed on the Reader Service Cards of items on which you want more information.

Your request for more information on any advertisement in this issue may be indicated by your circling the item number of the ad on the Reader Service Card.

Reader Service Cards are provided to assist foundrymen-readers to secure latest information on products and services --- we invite you to use them!

For more information, use Reader Service Card, page 245

FOUNDRY

Let's Talk

"PLANER"

. . . about pattern quality

City Pattern Foundry & Machine Company's Shrinkage Conversion Tables save time and eliminate errors in shrinkage calculations. Your letterhead request will bring a set of these handy tables without obligation.

The planer shown above is an important factor in making City Pattern Foundry and Machine Company a reliable source for metal patterns. In excellent condition, manned by a skilled operator, it starts off large patterns on an accurate foot toward later operations. Its capacity and modern design assure you of that accuracy at lowest cost.

In itself, a planer does not constitute a pattern shop . . . but as typical of the unusual equipment on our working team, it assures you of the facilities to make the finest patterns accurately and economically. And this is the very reason leading manufacturers have relied on City Pattern Foundry and Machine Company for almost forty years.

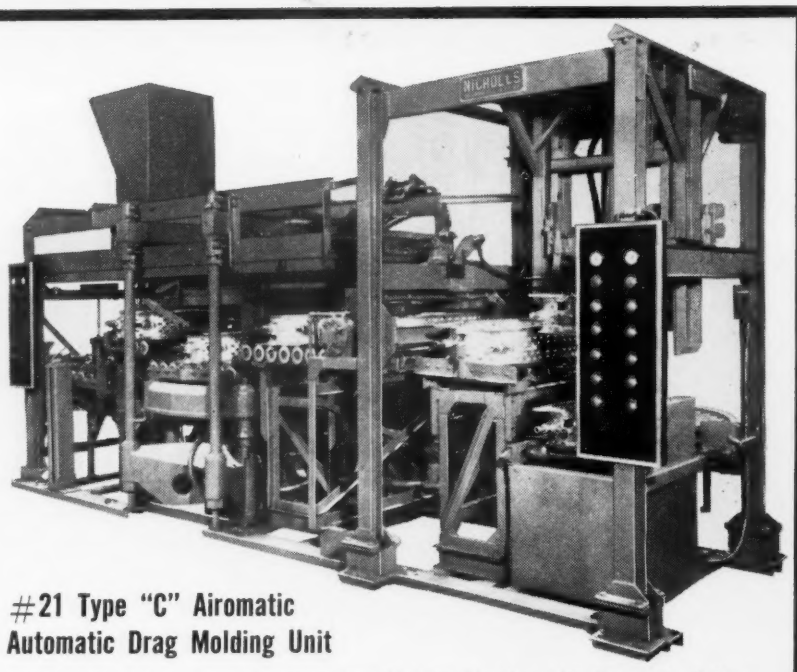
Setting the Pattern in Patterns

CITY PATTERN

FOUNDRY AND MACHINE CO.

1161 HARPER AVENUE • DETROIT 11, MICHIGAN

- **INCREASE** production . . .
- **SAVE** manhours . . .
- **GET** quality molds with the new



#21 Type "C" Airomatic Automatic Drag Molding Unit

Heavy Duty Jolt & Power Squeezer Drag Molding Machine with Pneumatic Pattern Draw. Equipped with air operated car type squeeze head and built-in flask roll-in and mold roll-out device with measuring sand hopper, flask indexing device and sand spill upset, flask feed-in elevator, mold turn-over and mold transfer.

NICHOLLS AIROMATIC

Nicholls has harnessed this molding machine's own driving force **airomatically** to give you a **better** job at **less** cost. There are no limit switches, no electrical timers, no electric pressure switches, no electrical latch relays, just **dependable,** reliable "push-button" air-to-air control throughout.

Yes, the new NICHOLLS AIROMATIC molding equipment makes, closes, removes and returns **consistent high-quality** molds **continuously . . . automatically.** It represents the acme of simplicity for the automatic production of high quality and high quantity mass produced sand molds.

Check **your** equipment **today.** Whatever your system, there's a Nicholls machine to fit the job. For information call or write

WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.

Compare this... with your **present equipment**

Can You

1. Push your "Stop" button and then after a pause, push your "Start" button and have your equipment continue with the next phase?
2. Push your "Stop" button and then after pushing several "Manual" buttons for subsequent phases, push the "Start" button and have your equipment continue automatically with the next phase?
3. Use a particular "Manual" button to pinch-hit in an emergency for a failed automatic phase in finishing out a molding shift?
4. Get 240 molds per hour (one every 15 seconds) hour after hour, shift after shift, day after day?

You CAN with a NICHOLLS AIROMATIC!

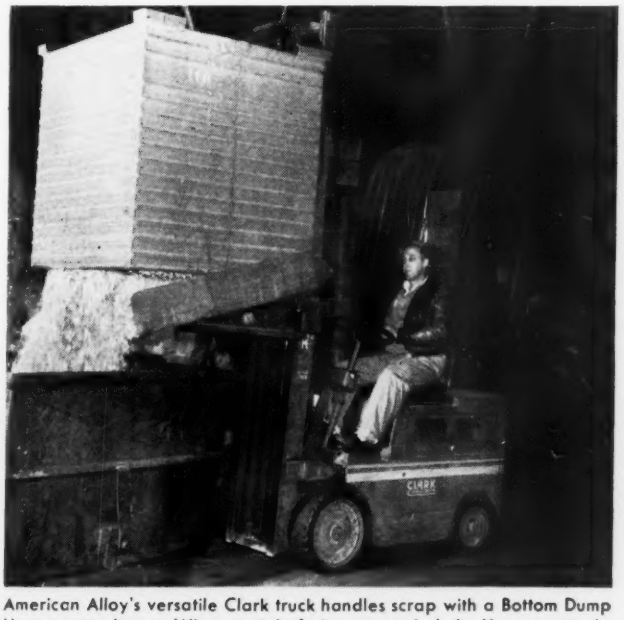
NICHOLLS

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT

Move them while they're hot! Moving ingots is just one of the many jobs handled by Clark trucks at American Alloy Co., Kansas City, Mo.

Move them while they're hot . . . cooling can cost you production!

In a fast operating foundry the time to move ingots is while they're hot. Minutes after drawing off the mold, a versatile Clark fork truck can pick up hot ingots . . . move them to storage for cooling. Floor space is kept clear for further production.



American Alloy's versatile Clark truck handles scrap with a Bottom Dump Hopper attachment. When straight forks are needed, the Hopper attachment is easily and quickly removed.

Or if the job calls for handling scrap, a Clark fork truck with a Bottom Dump Hopper is used. Or maybe the Clark truck will have Rotating Forks for dumping castings, or, maybe it will drive into annealing ovens to stack pots. The point is—whether using straight forks or special attachments—your Clark truck will keep busy on a multitude of jobs.

Gas, LP gas, diesel or electric—from ½ ton to 12 tons capacity—no matter what power type or size, your Clark truck is *full time* equipment. Take a look in the Yellow Pages under "Trucks, Industrial" for your local Clark Dealer. He's the man who can show you the dozens of uses a Clark truck has in *any* foundry . . . namely yours.

A BETTER BUY WITH LOCAL SUPPLY—*Genuine Clark Parts*

CLARK® EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

Circle 585 on Inquiry Card—Page 245

TISCO®

REPLACEMENT BLADES

...cure for high cost pressure in BLAST CLEANING OPERATIONS

TISCO Blade 25615 replaces Mfrs. Part Nos. 36473 and 154069.

TISCO Blade 23820 replaces Mfrs. Part Nos. 47130 and 143600.

The frequency of blade replacements is an important factor in blast cleaning costs. TISCO Replacement Blades for Wheelabrators* have given up to five times the life of other blades.

Recent changes in the design of TISCO Blades for Wheelabrators offer greater service life. The TISCO Blades now are wider and thicker across the wearing surface and latest field tests reveal substantial improvements over the original design.

The results of some of these tests are as follows:
Competitive Blade "A"—75 to 94 hours
Competitive Blade "B"—95 to 125 hours
TISCO Improved Blade—Over 200 hours

This design feature, backed by Taylor-Wharton's years of experience in the foundry field, not only adds extra life to your replacement blades for Wheelabrators but reduces down-time of your machines and enables you to use the best blade available at no increase in cost. All fitting dimensions are precision-ground and wearing surfaces have maximum smoothness. TISCO Replacement Blades are accurately balanced in sets. Ask your local dealer for them or order direct from us.

*Reg. U.S. Pat. Off. by Wheelabrator Corp.

TISCO BLADES are carried by foundry dealers throughout the United States and Canada.

TAYLOR-WHARTON CO.

DIVISION OF HARSCO CORPORATION

HIGH BRIDGE 7, NEW JERSEY

Birmingham, Ala. Chicago, Ill. Cincinnati, O. Easton, Pa. New York, N.Y.

Circle 587 on Inquiry Card→

Shell molds bonded with **RESINOX*736** have outstanding strength—even at 3100°F.!

Typical ESCO steel alloy castings molded in shells bonded with Resinox 736. Note the smooth finish and sharp detail which is achieved without costly machining.

Leading alloy steel foundry selects Monsanto's phenolic resin to reduce casting costs!

By shell casting alloy steel parts that formerly had been forged or welded, the Electric Steel Foundry Company, Portland, Oregon, is reducing cost of some parts by as much as 60%!

Since 1951 the company has standardized on bonding shells with Resinox 736 because of its outstanding performance and versatility. Machine finishing has been virtually eliminated. Excellent detail and close tolerances are maintained, together with conservation of material.

The excellent hot strength of shells bonded with Resinox 736 is particularly appreciated at ESCO. On some jobs steel alloys are as hot as 3100° F. when poured into molds.

According to John Oettinger, the company's shell molding project engineer, "Resinox 736 combines *desirable* compromises in the many factors to be considered in a bonding agent. Our use of this material has enabled us to upgrade the castings we specialize in for both manufacturing and processing equipment."

Because the economy and quality of shell molding depends so much on the resin used, it will pay you to investigate Resinox. 736 is suitable for most applications. Other Resinox phenolic resins are available to meet special problems.

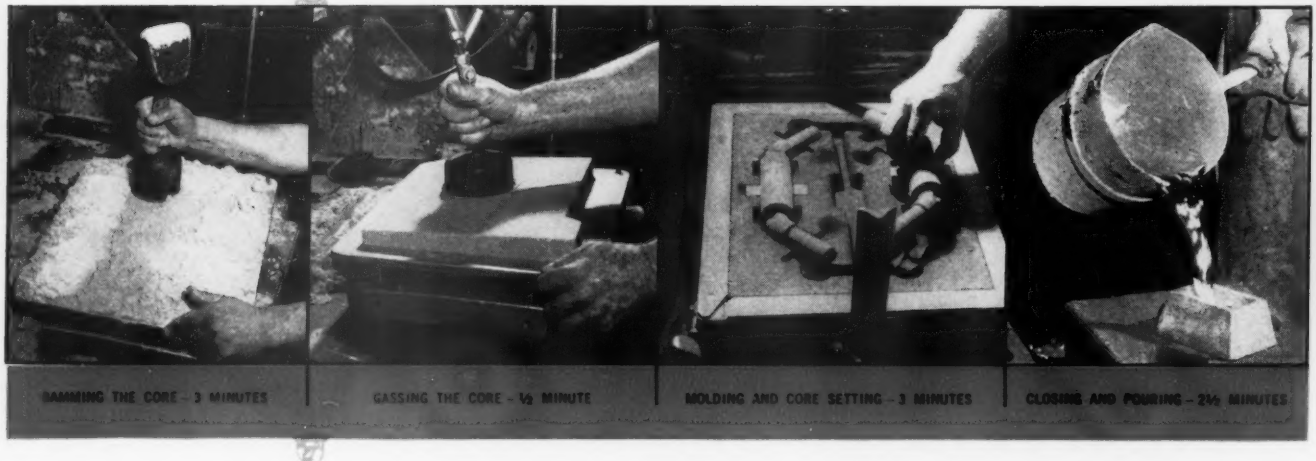
All Monsanto resins are research-developed and shop-tested to meet your foundry needs. For data sheets and complete information on shell molding, core binding and sand conditioning resins, write Monsanto Chemical Company, Plastics Division, Room 452, Springfield 2, Massachusetts.

MONSANTO

*Resinox: Reg. U. S. Pat. Off.

DonCO2

BINDER FOR THE CARBON DIOXIDE PROCESS



FREE Send for booklet on High Pressure Molding of CO_2 Sands.

In addition to its use for jobbing core work, dry sand molds and production of cores too large or too numerous for the existing core oven capacity, the CO_2 process combines well with the *Taccone Machine* to produce high pressure "cured" shell molds for precision castings.

Plasti-Bond and *Taccone* combine to make high pressure molding of green sand practical for a wide range of applications. However, some jobs just can't be made in green sand because of erosion or insufficient dry strength for certain shapes and designs. In this case, it is possible to produce a contoured "shell" using the *Taccone Diaform Machine* and *DonCO$_2$* sand in tight flasks. The half molds can be gassed, assembled and poured in a matter of seconds to provide precision castings. *DonCO$_2$* sand is flowable under high pressure squeeze to provide maximum density, minimum bond addition and maximum dimensional control. Fine sands and small additions of *Plasti-Bond* or *Triplact* provide the finish and peel for "super-finish" with the CO_2 process for all cast metals.

- ★ **Cores without ovens and dryers.**
- ★ **Dimensional accuracy.**
- ★ **Core box to mold—in minutes.**
- ★ **Dry sand accuracy with green sand speed.**
- ★ **Minimum hooks and wires.**
- ★ **Low gas content.**
- ★ **Low initial cost.**
- ★ **Core production "on the job," as needed.**

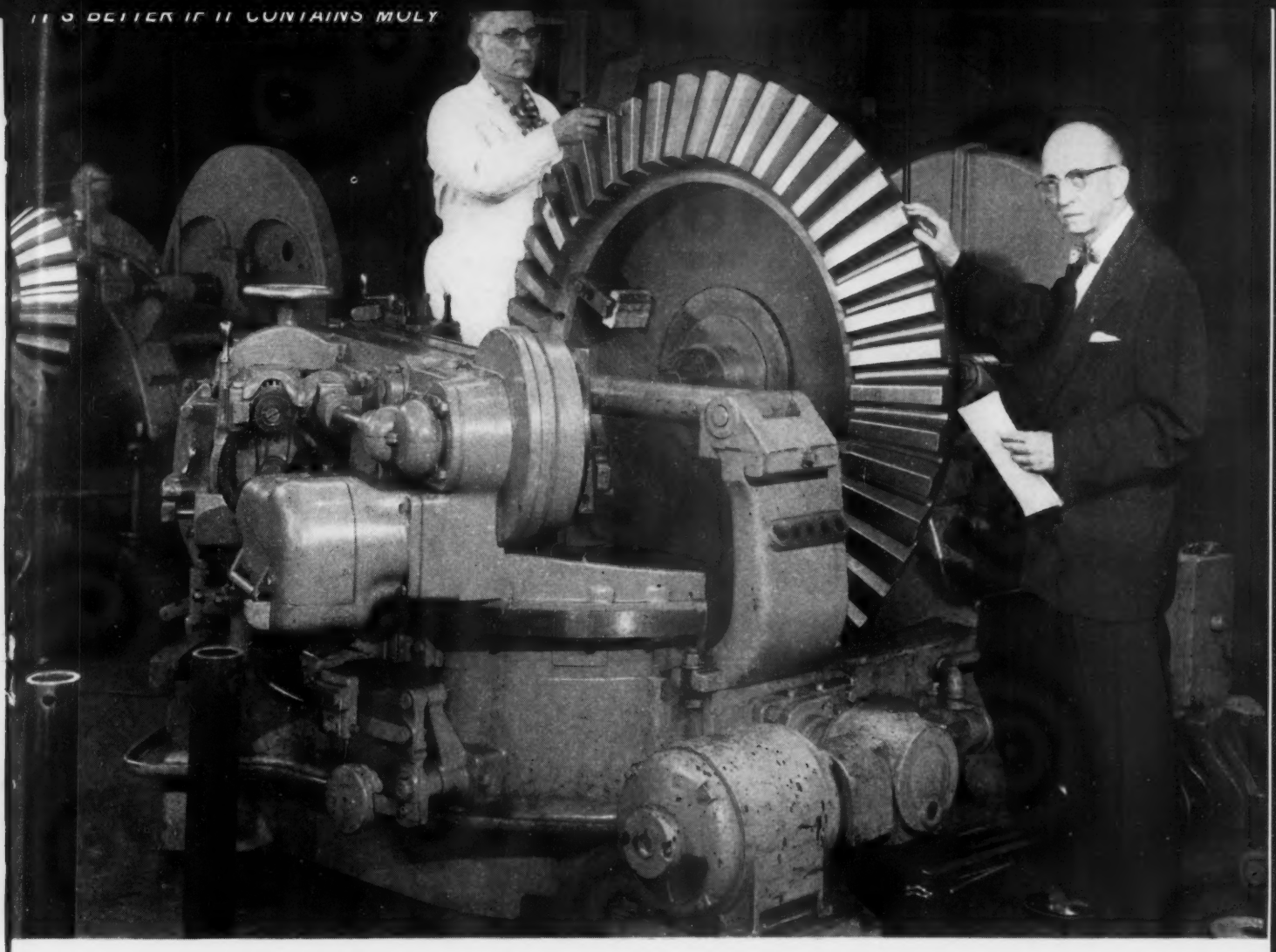
EASTERN CLAY *products dept.*

INTERNATIONAL MINERALS & CHEMICAL CORPORATION, *20 North Wacker Drive, Chicago 6*

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • PLASTI-BOND • REVIVO CORE PASTE • CUPOLINOR • CUPOLINE • TACCONE MOLDING MACHINES

Circle 588 on Inquiry Card—Page 245

IT'S BETTER IF IT CONTAINS MOLY



E. B. Smiley, Metallurgist for Illinois Gear & Machine Co., looks over setup of large, heavy duty bevel gear made from molybdenum alloy steel casting. This gear has been rough turned, rough cut and heat treated to 269 to 302 Brinell before finish cutting.

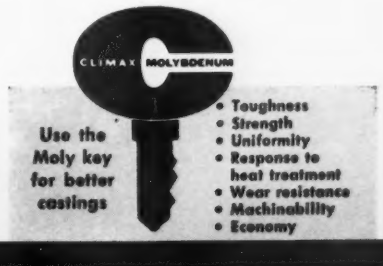
For Strength, Hardness and Machinability gear maker recommends Molybdenum Alloy Steels

"All of our gears are made to customer specifications, and in many cases these include the use of molybdenum steels," says Mr. Smiley, metallurgist for Illinois Gear & Machine Co. "When our customers specify heat-treated gears of plain carbon steel," Mr. Smiley continues, "we often recommend that they change to 4140 alloy containing molybdenum to achieve high strength and hardenability with good machinability."

Moly steels offer gear users many advantages over carbon steel. Their greater strength and toughness permit the use of smaller weight-saving gears to transmit a given amount of power. Reduced weight and size of gear housings and other components add to the economy of moly steels. And their higher endurance is an important safety factor.

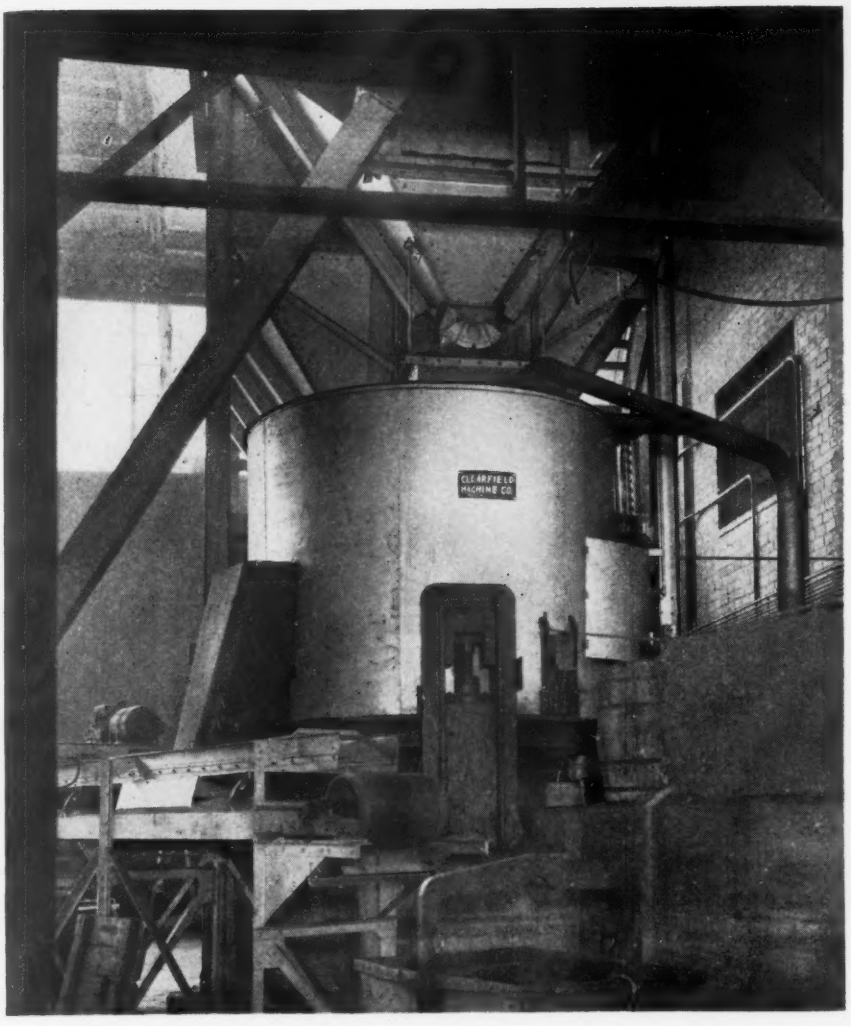
The properties of moly steels are discussed in a new booklet "Moly Steels for Cast Gears". Full technical assistance is also yours for the asking. Write Climax Molybdenum Co., Dept. 20, New York 36, N. Y.

CLIMAX MOLYBDENUM



Circle 589 on Inquiry Card—Page 245

silica grains, bond and moisture are *Perfectly Blended* with a



CLEARFIELD MIXER

Sand quality depends on how well three elements are blended. Silica grains, bond and moisture make up the major part in preparing quality sand. The performance of Clearfield Mixers is based on preparing better foundry sand.

Employing the revolving pan principle with vertically rotating mullers, Clearfield Mixers transform the sand from an inert mass into a fluid moving stream by the stirring action of the agitator and centrifugal force. This results in a perfect blending of the three elements . . . thereby producing a better foundry sand.

Write today for Catalog No. 83. See why there is a Clearfield Mixer for every requirement.

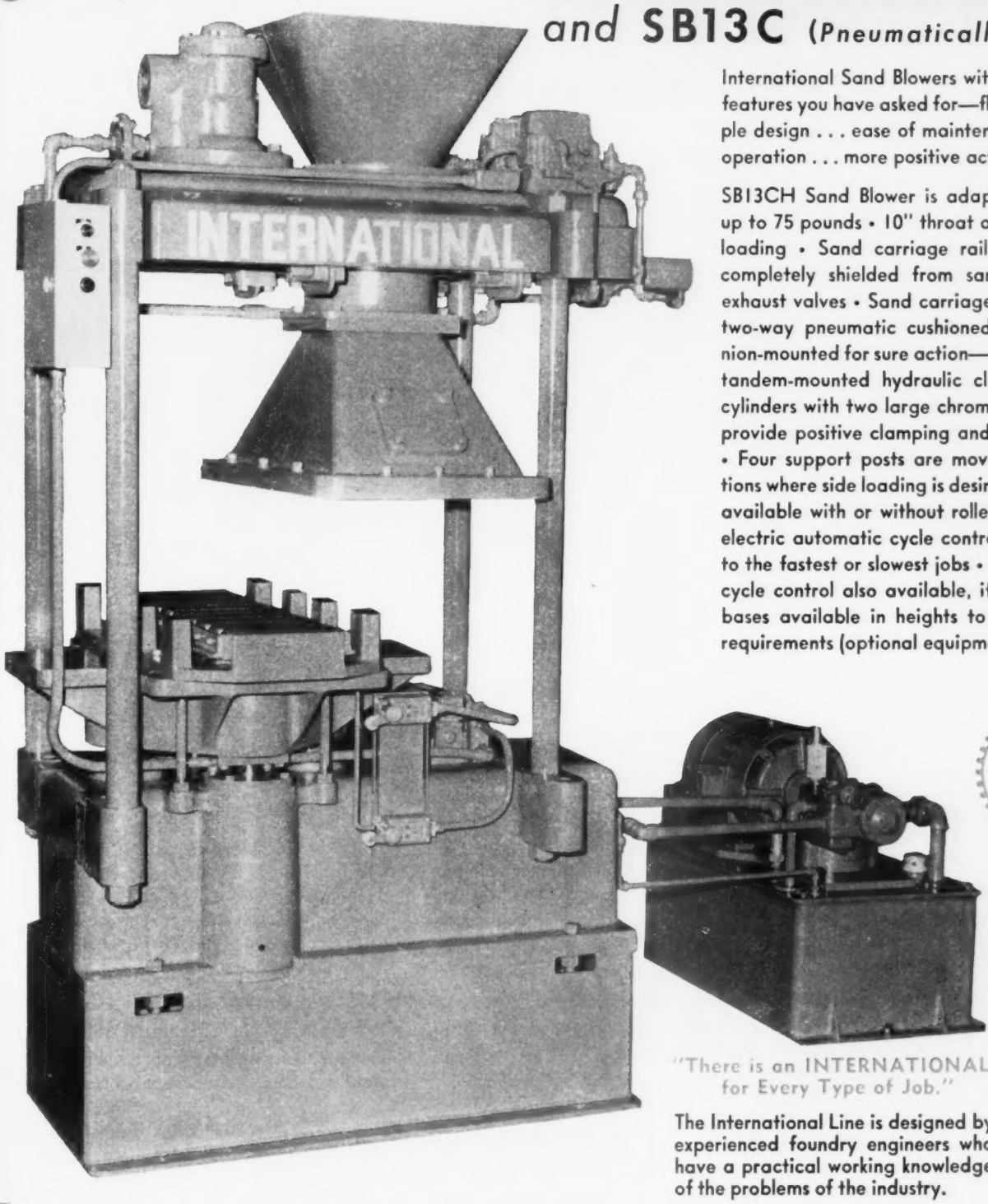
CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

Circle 590 on Inquiry Card—Page 245

OUNDRYMEN—here are the Sand Blowers you asked for . . .

INTERNATIONAL'S *New* SB13CH

and SB13C *(Pneumatically operated)*



International Sand Blowers with all of the new features you have asked for—flexibility . . . simple design . . . ease of maintenance . . . faster operation . . . more positive action!

SB13CH Sand Blower is adaptable for cores up to 75 pounds • 10" throat opening for easy loading • Sand carriage rails and bearings completely shielded from sand • New-type exhaust valves • Sand carriage operated by a two-way pneumatic cushioned cylinder, trunnion-mounted for sure action—no springs • Two tandem-mounted hydraulic clamp and draw cylinders with two large chrome-plated guides provide positive clamping and accurate draw • Four support posts are movable for operations where side loading is desired • Draw table available with or without rollers • Completely electric automatic cycle control can be timed to the fastest or slowest jobs • Hand operated cycle control also available, if desired • Sub-bases available in heights to meet conveyor requirements (optional equipment).

"There is an INTERNATIONAL for Every Type of Job."

The International Line is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS

Circle 591 on Inquiry Card—Page 245

All-Plastic Goggles

AO† LIGHTWEIGHT, SPECTACLE GOGGLES PROVIDE COMPLETE INTERCHANGE OF LENSES AND TEMPLES!

Illustrated are Nos. 786 and 787 — two of the latest and lightest AO All-Plastic Lens Goggles, with noncorrosive endpieces and metal skull temples. In the field of lightweight eyecare they show the same benefits of applied engineering as AO's goggles for heavier exposures.

Lenses, endpieces, and temples can be easily replaced or assembled. One-piece lenses of either clear or green acetate have high impact resistance. Replacement is simple — just slide off the endpieces and re-assemble. No. 786 is ideal for use over regular spectacles for temporary or "on and off" wear. Model 787 is identical except that it has side shields for added protection against laterally flying particles. Both of these goggles are available with comfort cable temples upon request.

Recommended Uses

(1) For light grinding, light machining, spot welding, woodworking, yard work where dust hazards exist, and for protecting Safety Glasses or regular glasses.

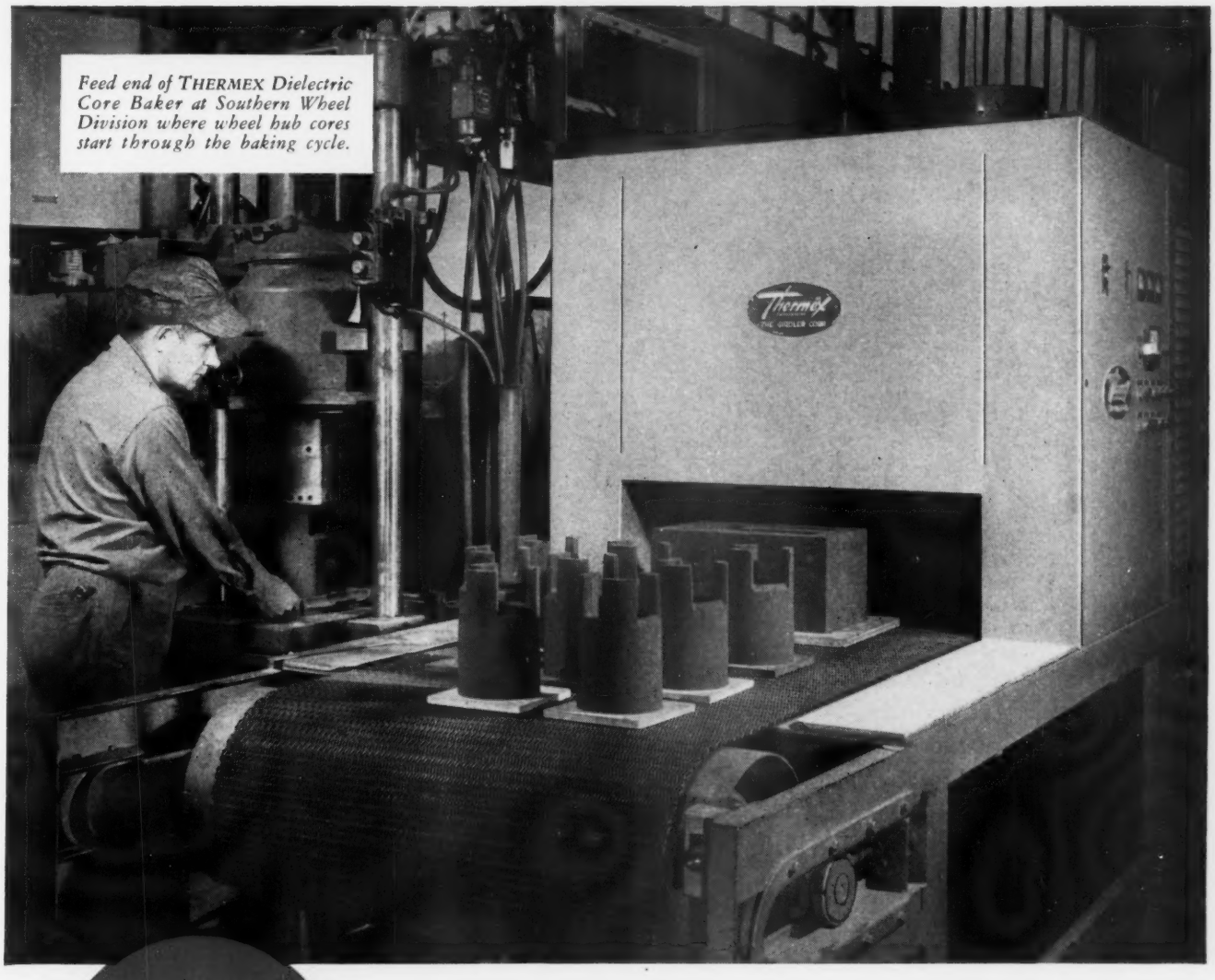
(2) For plant visitors and others who may be exposed to eye hazards for short periods.

Keep an adequate supply of these goggles (and extra lenses) on hand always for good fitting. Check with your nearest AO Safety Products Representative.

American Optical
SAFETY PRODUCTS DIVISION

†T.M. Reg. by American Optical Company

Circle 592 on Inquiry Card—Page 245



Feed end of THERMEX Dielectric Core Baker at Southern Wheel Division where wheel hub cores start through the baking cycle.

Thermex®
ELECTRONIC CORE-BAKING EQUIPMENT

Produces high quality, low cost cores for American Brake Shoe Company

The modern plant of The Southern Wheel Division of American Brake Shoe Company at Calera, Alabama, is designed for continuous-flow production of cast steel freight car wheels. THERMEX* Core Baking Equipment contributes to the high output, low cost operation of this plant.

This progressive firm specified high-speed THERMEX Core Baking Equipment because it is capable of producing the high-precision, properly cured cores essential to sound castings. With this dielectric equipment, every grain of sand gets the proper amount of heat. This uniform heating eliminates over-heating and distortion — results in smoother, more accurate castings. The equipment cuts costs in many ways, too—in man-hours, in rejects, in floor space required.

If you're searching for ways to improve your product and cut costs, investigate THERMEX Core Baking Apparatus. A letter or a phone call to The Girdler Company, Thermex Division, Louisville 1, Kentucky, will get you all the facts.

*THERMEX—Trade-Mark Reg. U. S. Pat. Off.

The GIRDLER Company
A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY
THERMEX DIVISION

Circle 593 on Inquiry Card—Page 245

LITHIUM

...the Miracle Metal

Over 100 Brass & Bronze Foundries Can't Be Wrong!

Last year over 30,000,000 pounds of copper were degasified with Lithium Metal . . . and the volume is constantly increasing. A little Lithium goes a long way. It's a fact that only 0.005% metallic Lithium makes a sounder, more uniform, nonferrous casting . . . in less time with less trouble and at lower cost.

Large size Lithium Cartridges (108 grams) are used for the degasification of large melts of copper including high conductivity metal. Small Lithium Cartridges (2¼, 4½ and 9 grams) are for foundry use in the refinement of high temperature copper, brass, bronze, and nickel-silver castings. Even the salts of Lithium (Carbonate and Chloride, especially) hold great promise for heat treating by reason of their properties in lowering bath melting points.

Is *your* foundry using Lithium? Truly the "ally of alloys," Lithium could hold the same hope for *you*. Look into Lithium. Write for details on actual foundry tests.

. . . trends ahead in industrial applications for lithium

LITHIUM CORPORATION OF AMERICA, INC.
2600 RAND TOWER
MINNEAPOLIS 2, MINN.

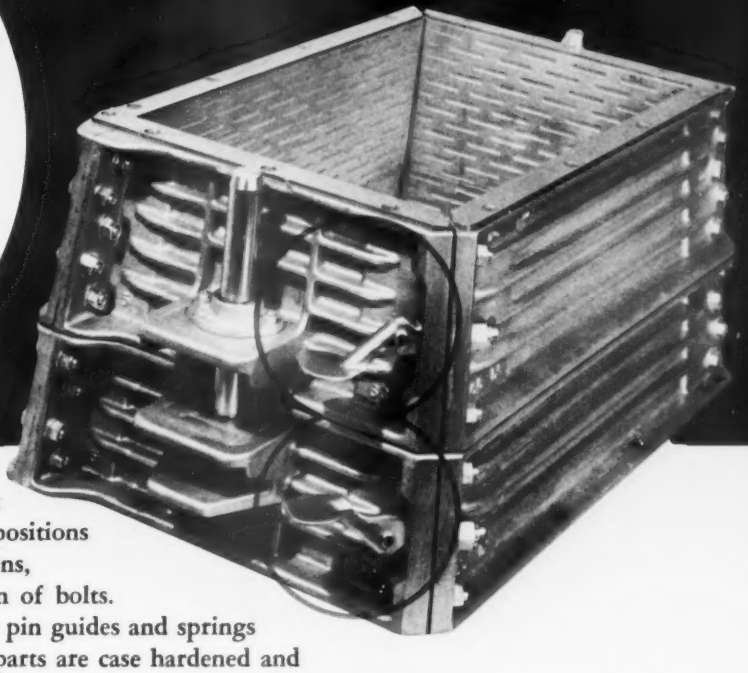
MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York Pittsburgh • Chicago • CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

Circle 594 on Inquiry Card—Page 245

Circle 595 on Inquiry Card→

for MORE and BETTER MOLDS...

you can't beat the MONARCH KWIK-STRIP MECHANICAL CORNER FLASK



Locking handle bolts work directly in a straight line. Handles can be placed in any one of four positions (up and down position shown above). Flask opens, closes and locks with positive straight line action of bolts. Binding on working corner is eliminated. Corner pin guides and springs are completely sealed against sand. All working parts are case hardened and cadmium plated. Draw pins are hard chrome plated, centerless ground and polished for true diameter. Forged and plated guide bushings. Cold Rolled wear strips are standard on top of cope and bottom of drag. Wear strips on parting flanges optional. Sides are flat so flask can be set on edge without danger of tipping.

CONSTRUCTION: Precision built from cast aluminum or magnesium. Made with the most modern jigs and fixtures and machine tools to insure accuracy.

AVAILABLE SIZES: 12″ width x 4″ depth to 30″ width x 7″ depth; 12″ long x 4″ depth to 30″ long x 7″ depth, in increments of one inch. Upsets available in 1″ x 2″ depths 4° and 5° tapers available.

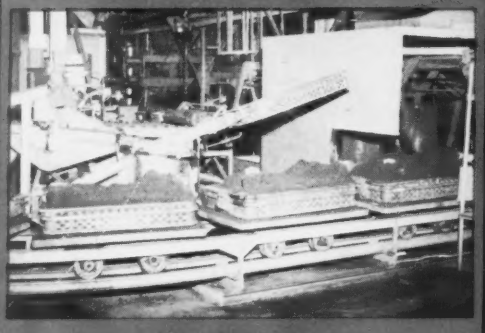
Cast aluminum or iron jackets available to fit all flask sizes listed above.

"Another Foundry product by"... **NEWAYGO** engineering company newaygo, michigan

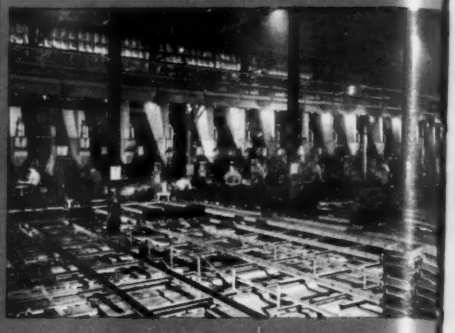
FROM INDIVIDUAL UNITS TO COMPLETE SYSTEMS

our job is serving your sand handling needs better

COMPLETE SANDHANDLING SYSTEMS



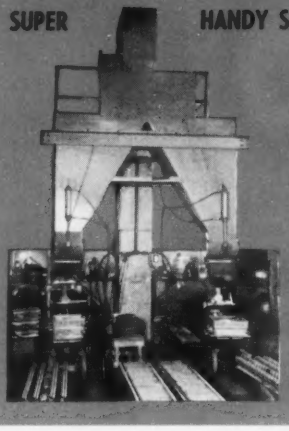
CAR CONVEYORS



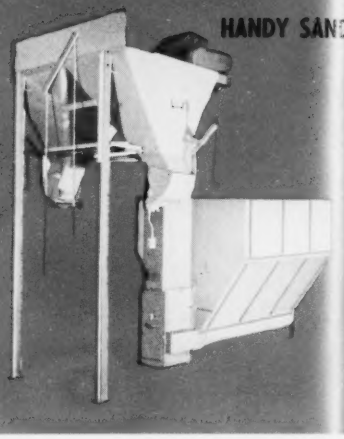
PALLET TYPE CONVEYORS

REDDY SANDY

SUPER HANDY SANDY



HANDY SANDY



"Foundry Business is **BIG** *Business"*

NEWAYGO engineering company

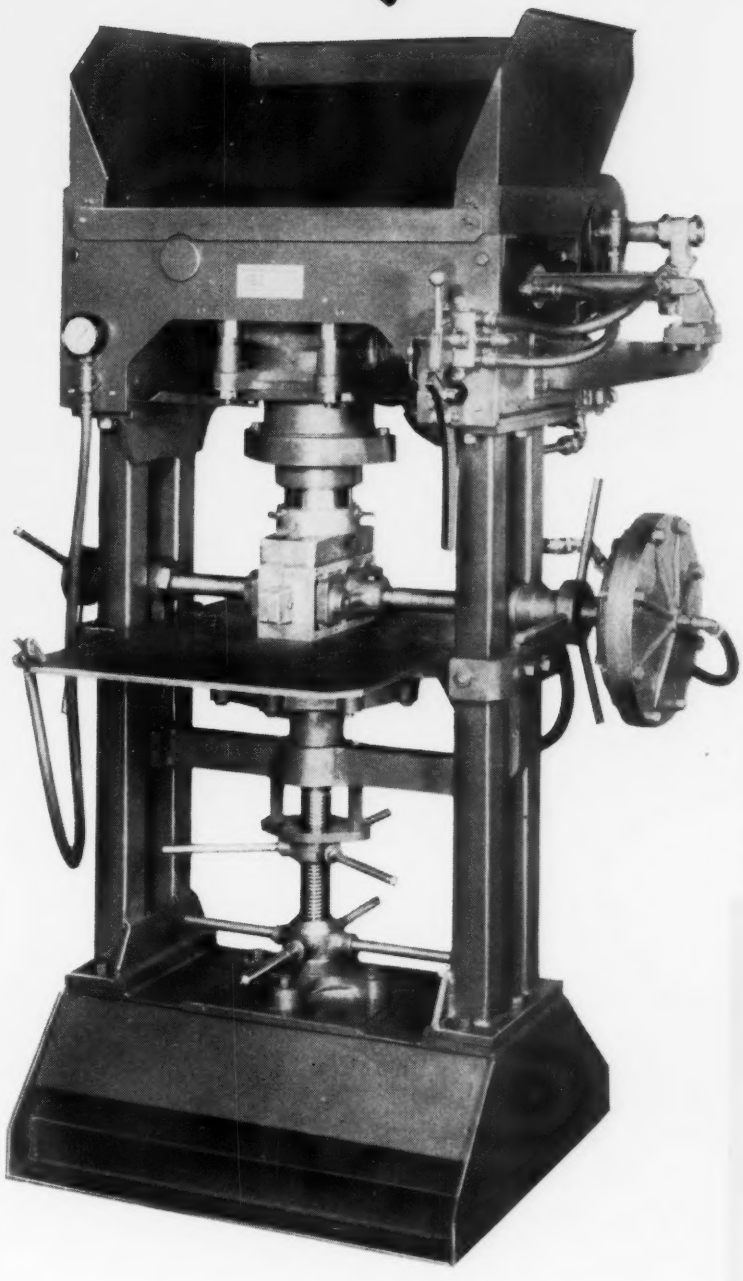
NEWAYGO, MICHIGAN

. . . and profitable too, with **NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT**

CONTACT YOUR NEWAYGO SALES REPRESENTATIVE

W. THOMAS BARR ASSOCIATES 2824 Central Av., Homewood P. O. Box 5832 Birmingham 9, Alabama Telephone: Tremont 1-8987	Alabama, Florida, Georgia, Louisiana, Mississippi, Texas (eastern), Tennessee
RUSSO FOUNDRY EQUIPMENT CO. P.O. Box 194 Elmhurst Station Oakland 3, California Phone: Lockhaven 8-1303	Arizona, California, Idaho, Montana, Nevada, Oregon, Utah, Washington Canada—British Columbia, Alberta, Saskatchewan
CONTACT NEWAYGO OFFICE UNTIL FURTHER NOTICE	Ohio (all but N.W. corner) Western Pennsylvania West Virginia Covington, Kentucky
MR. A. N. VOLK 4352 North Keeler Avenue Chicago 41, Illinois Telephone: Avenue 3-0855	Illinois (northern half) Iowa (Davenport area only) Wisconsin
THE FOUNDRY SUPPLY CO., INC. 7600 Highway 7 Minneapolis 16, Minnesota Telephone: West 8-2765	Iowa (except Davenport area) Minnesota, Nebraska
MR. O. H. KASTENS Newaygo Engineering Co. Newaygo Michigan Telephone: 3821	Indiana (northeastern) Michigan (southern half) Ohio (northwestern corner)
MR. G. E. MARCKRES 426 West Wabash Street Bluffton, Indiana Telephone: 1612-W	Indiana (all but northeastern section)
MR. R. W. FERGUSON Newaygo Engineering Co. Newaygo, Michigan Telephone: 3821	Michigan (northern half) Michigan (Upper Peninsula)
NEWMAN FOUNDRY SUPPLY CO. 665 Pine Avenue P. O. Box 160 St. Lambert, Montreal 23, Quebec, Canada Telephone: Orchard 1-1926	Canada—Prov. of Ontario and Quebec, east of Kingston; New Brunswick, Nova Scotia and Prince Edward Island
WARK FDRY. EQUIP. CO. P. O. Box 2308, Hiler Br. Kenmore, New York Telephone: Riverside 4469	New York State (except Metropolitan New York) Pennsylvania (northwest)
DON BARNES FDRY. SUPPLIES & EQUIP. 605 James Street North Hamilton, Ontario, Canada Telephone: Jackson 7-7436	Canada—Prov. of Manitoba and Ontario east to Kingston
MR. C. H. PALMER, Jr. 32 Tamarack Lane Levittown, Pennsylvania Telephone: Windsor 5-1508	Metropolitan New York New Jersey, Delaware Maryland, Washington, D.C. Pennsylvania (central) Virginia, North Carolina, South Carolina
MR. L. C. (Carl) BEERS 19021 Hillcrest Blvd. Birmingham, Michigan Telephone: Midwest 4-7798	Special representative in the Detroit Area
MR. R. J. BRANDT N. E.—Brandt Co. Cocheco Avenue Branford, Connecticut Telephone: Hubbard 8-2143	Connecticut, Vermont Maine, Massachusetts New Hampshire Rhode Island
FRANCISCO GOVANTES P.O. Box 2546 Havana, Cuba	Cuba

Redford NO. 4 CORE BLOWER



Designed to add more power, capacity, and speed to traditional Redford simplicity, flexibility and convenience, the No. 4 Redford superbly fills the need for a truly fast and flexible machine to blow cores from a few ounces to 10 lbs.

There is no need for the operator to wait for the machine at any time — the fast operating cycle permits immediate release of the core box after the cores have been blown.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

Magazine heads normally furnished with the No. 2 Redford machine can be used with the No. 4 Redford. Larger new type magazine heads are also available as standard equipment.

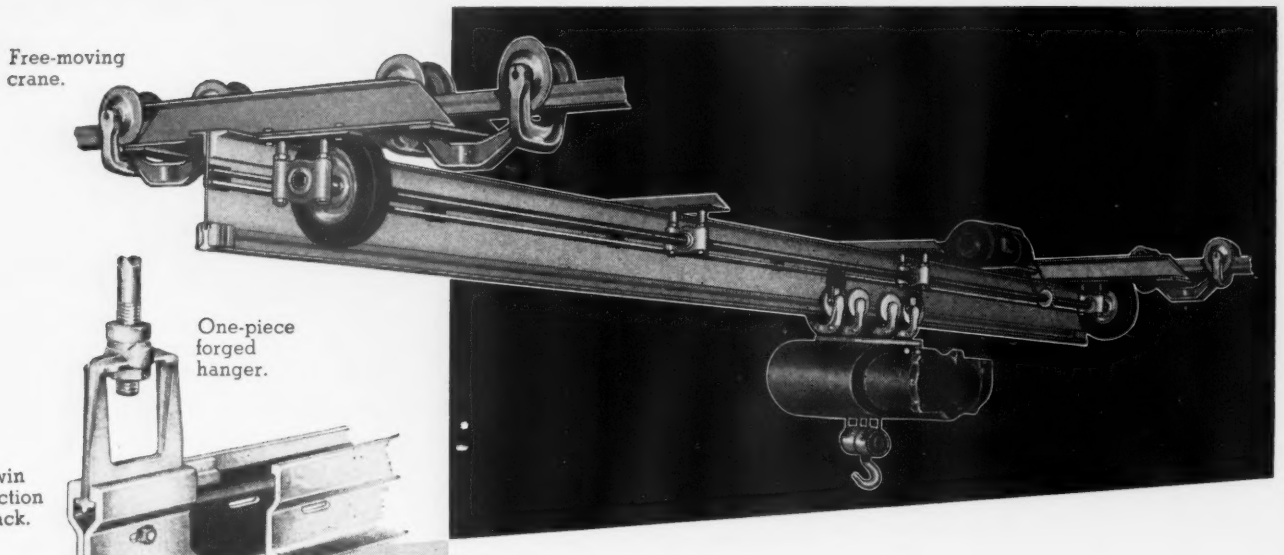
A completely new fully adjustable clamp for vertically parted core boxes simplifies core box set up — when not needed the clamp units can be adjusted all the way out or completely taken off the machine.

Redford No. 4 users report production up to 8 boxes per minute using only one core box per machine. To get complete information write for Specification Bulletin 4.

Cores at right illustrate wide range of work that can be done with the Redford No. 4 Core Blower.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN • PHONE: KENWOOD 1-8611



TAILOR-MADE SYSTEMS
FROM STANDARD PARTS

Standard American Monorail units offering the many advantages illustrated, are combined into systems for handling any type of unit loads.

These systems are available for manual, electric or automatic operation with local or remote control.

Experienced Monorail engineers will tailor-make a cost-saving handling system from standard parts to fit your specific needs.

Write today
for Bulletin C-1.

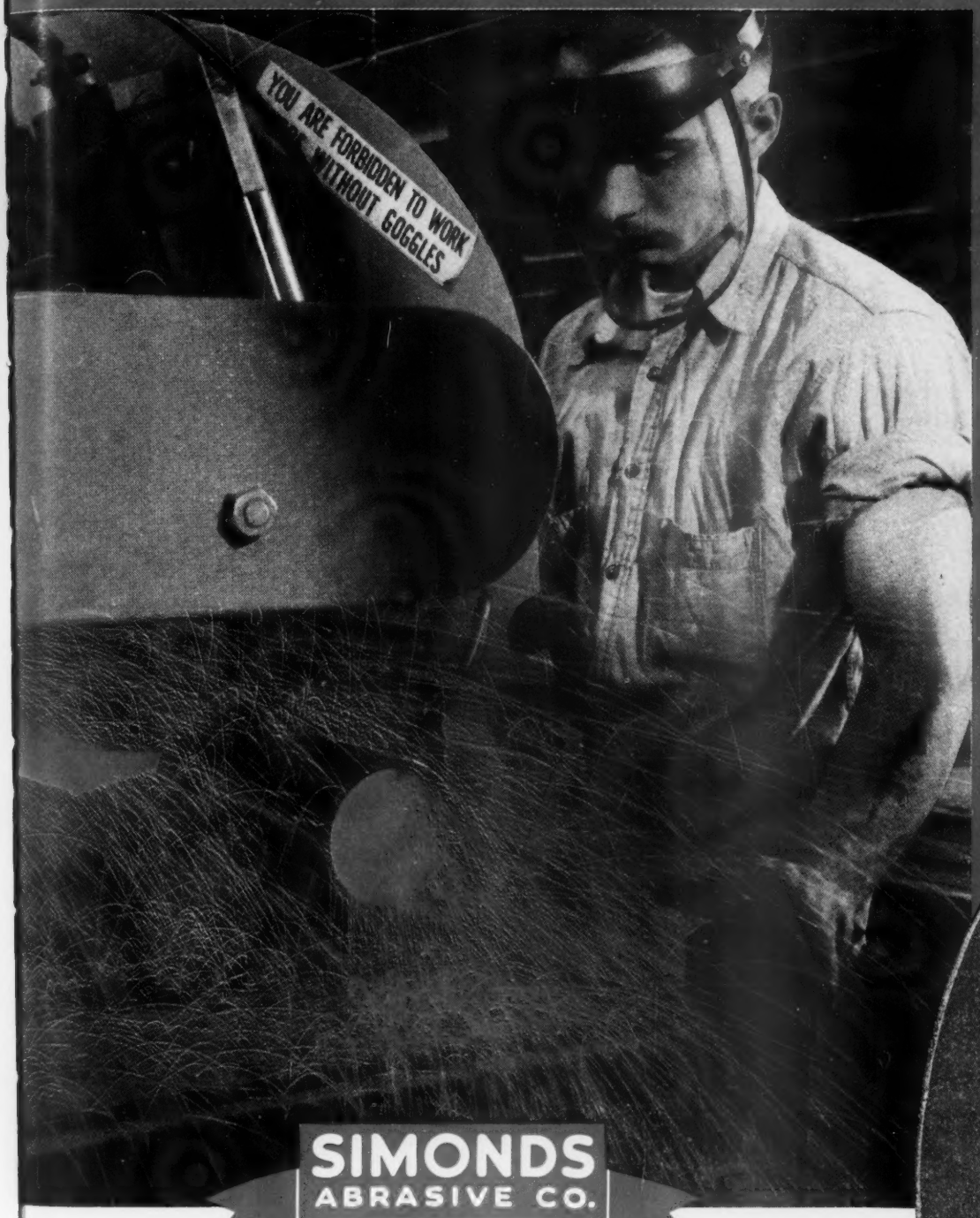
Member of Materials Handling Institute - MonoRail Association

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13104 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

Circle 597 on Inquiry Card—Page 245



- more speed
- less waste
- greater accuracy

SIMONDS ABRASIVE CO.

Cut-off wheels . . .

These thin, fast-cutting, resinoid-bonded wheels slice through the hardest-to-cut materials in seconds, giving more cuts per wheel — less stock waste — and essential accuracy in cutting lengths to close tolerances. They often eliminate finishing, too, since the ends they produce are smooth. Operating speeds from 10,000 to 12,000 s.f.p.m. (16,000 s.f.p.m. on specially designed machines.) Write for bulletin ESA-163 and name of distributor.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco. Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass.

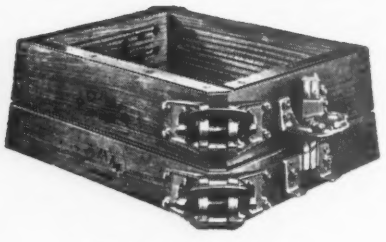
Circle 598 on Inquiry Card—Page 245

CALL YOUR SIMONDS DISTRIBUTOR

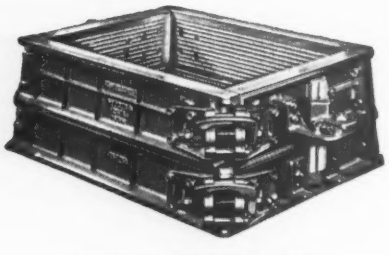
LOCAL STOCK
FAST SERVICE

REDUCE YOUR COSTS

ADAMS Cast Iron or Cast Aluminum Jackets



CHERRY EASY-OFF FLASK



ALUMINUM EASY-OFF FLASK

Look at these features and you'll agree that the Adams line can mean economy, efficiency, and better molds for your foundry.

Above is the Adams jacket available in either cast iron or cast aluminum. They are cast from a top grade metal mixture best suited for their purpose. The sturdy construction as a result of the vertical ribs inside and horizontal ribs outside plus the handles at either end assure you of long life for this equipment and ease in handling. These jackets afford you MAXIMUM STRENGTH and MINIMUM WEIGHT.

Here are jackets that assure you perfect mold fit—will give you the greatest strength while under pouring strain—allow for free flow of gases all because of INSIDE CORRUGATIONS. These VENTILATED jackets are first choice in foundries across the nation.

Look into the advantages cast iron or cast aluminum can offer you depending upon your foundry needs. We will be happy to make recommendations to fill your requirements.

For the most complete line of flask equipment available . . . always look to Adams!

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

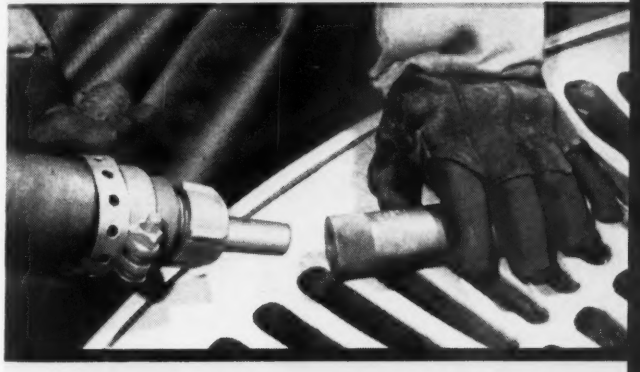
700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 599 on Inquiry Card—Page 245

BLAST!

BIG ones like this

or small ones, too! . . . . .



. . . . More Economically with

Norbide® Pressure Blast Nozzles

THERE'S a NORBIDE Nozzle available to give you exactly the type of cleaning stream you need — from a broad stream for large areas to a pencil-thin stream for cleaning small openings. And NORBIDE Nozzles — lined with the hardest manufactured material commercially available — maintain stream contour, last longer than any other nozzle made and deliver maximum blasting efficiency at minimum cost per hour.

For full details on cost-cutting NORBIDE Nozzles, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond St., Worcester 6, Mass.

NORTON®
BORON CARBIDE

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

NORBIDE®. . . . The Longest Nozzle Life You Can Buy

THAT one is no good!

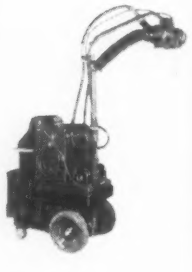
Wouldn't you like to be *that* sure about duds in your own production? Nondestructive radiography (either x-ray or gamma ray) could do it for you maybe.

***Anything* you buy or sell which needs "seeing into" is fair game for this versatile inspection method . . . weldments, castings, assemblies, plastics, wood, metal . . . right across the board from paper-thin stuff to foot-thick steel.**

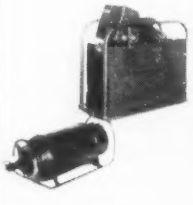
If you need to spot hidden defects to keep a firm finger on quality control, we'll be glad to tell you what radiography can do for you.*

** There's probably a Picker District office near you (see local 'phone book). Or write Picker X-Ray Corporation, 25 South Broadway, White Plains, New York.*

5 to 50 KV
Small as a filing cabinet, yet it will x-ray anything up to ¼" thick aluminum. Self-contained, completely rayproof.

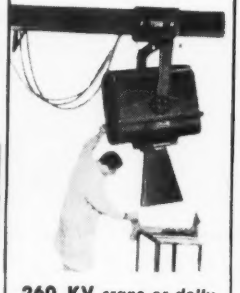


150 KV
Penetrates up to 1" steel and 5½" aluminum (more with screens). Stationary or mobile for "on-the-spot" x-raying.

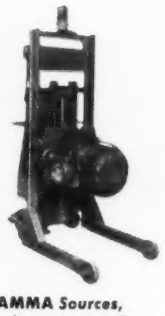


250 KV *portable*
Rugged, lightweight 250 KV tubehead with separate remote power chassis. Will enter openings as small as 15" square.

RADIOGRAPHIC CABINETS
Rayproof enclosures obviate need for lead-lined rooms. Available with or without feeder tables.



260 KV *crane or dolly*
For heavy-duty inspection (up to 3" steel). Operating down to 60 KV, will x-ray a wide range of other materials.



GAMMA *Sources, equipment, containers.*
Panoramic, circumferential, and directional projectors using cesium, iridium or cobalt isotopes.

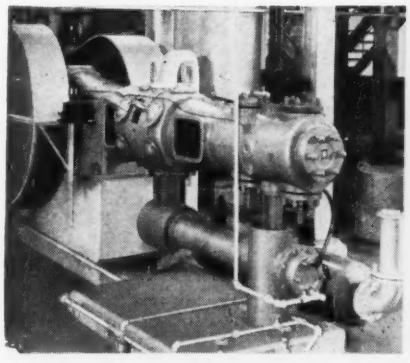
one source for everything in Picker x-ray **radiography and fluoroscopy**

Circle 601 on Inquiry Card—Page 245

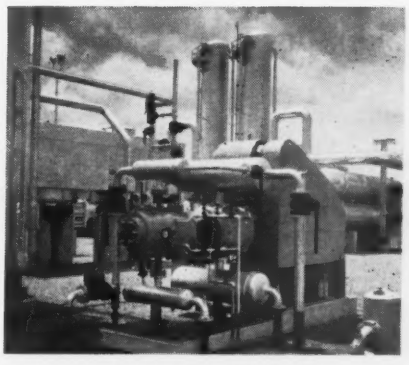
For jobs like THESE

CHOOSE HEAVY-DUTY ES COMPRESSORS

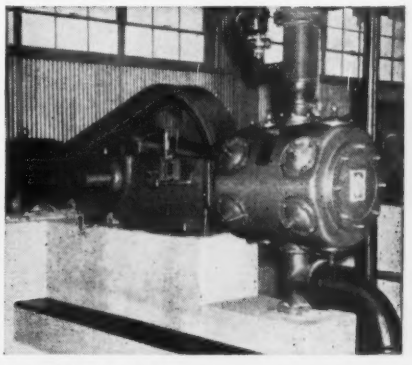
for pressures to 2500 psi—sizes 5 to 150 horsepower



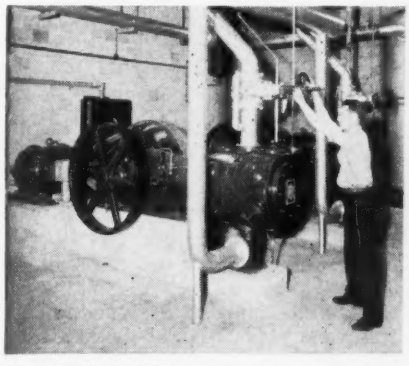
SOOT BLOWING The steam power plant of a large paper mill uses this ES to furnish high pressure air for boiler-tube soot blowing. This V-belt driven 125-hp unit compresses air to 350 psi in two-stages.



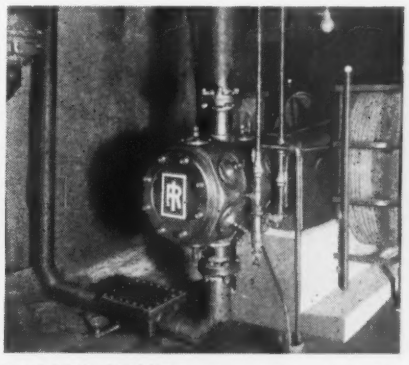
PROCESS GAS COMPRESSION In this unique outdoor installation, a two-stage ES compressor with V-belt drive compresses still vapors in a large modern gasoline plant.



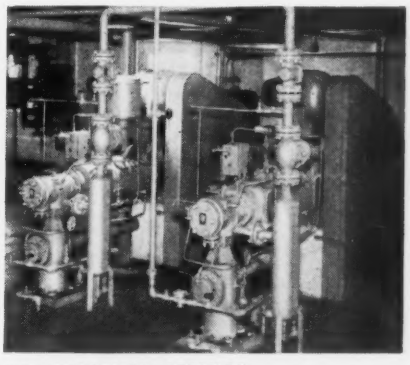
AIR LIFT SERVICE Shown here are two of the three Ingersoll-Rand ES compressors installed in a copper mine to provide pressure for elevating acid from the bleaching tanks by the air-lift principle.



GLASS MOLDING Here in a large lamp manufacturing plant, two ES compressors supply 50-psi air for cooling gas furnaces and for high pressure gas jets used in glass molding. Pressure is reduced to 30 psi to drive air-motor driven agitators.



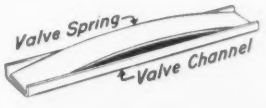
BOOSTER SERVICE Installed on the 4600 ft level of a large mine, this Ingersoll-Rand ES compressor boosts air pressure to get full power out of rock drills and other air-powered equipment.



AIR STARTING SERVICE A large transcontinental pipeline station uses these two ES compressors to supply 250-psi starting air to its I-R gas engine compressors. Both have overhead motors and one unit is provided with a standby gasoline engine.

SHOWN here are just a few of the countless ways in which Ingersoll-Rand heavy-duty ES compressors are serving industry. A wide range of standard cylinder arrangements and types of drive enables them to meet virtually any operating conditions within their size and capacity limits. Their efficiency is high and operating and maintenance costs low. Ask your I-R representative for help in solving any compression problem.

Only I-R compressors have CHANNEL VALVES



Known for high efficiency, quiet operation and almost unbelievable durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which give cushioned action.

Ingersoll-Rand

1-394 **11 Broadway, New York 4, N. Y.**

COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS

The Mute Swan is not a native bird, having been introduced from Europe. Nor is it mute, for when angry it hisses and when calling its young it makes a noise similar to the bark of a small dog. In England, the swan is regarded as a royal bird and ownership must be approved by the crown. This is an ancient custom, enacted in 1482 during the reign of Edward IV. To this day, the swans on the Thames belong to the crown and two city companies, all three having distinct "swan-marks" on their respective birds.

The Mute Swan, the swan of our parks and country estates, is another of Nature's families distinguished by identical appearance. This uniformity is especially noticeable when a group of swans, such as shown here, gathers at the edge of a lake or glides with ease and grace over the water.

HINES Pins and Bushings, too, are noted for uniformity. Carefully machined from the finest steel, hard chrome plated and precision ground to .002″ tolerance, they possess accuracy and uniformity rarely, if ever, found in nature. For pins and bushings that assure quick, accurate alignment, won't rust, don't require lubrication—pins and bushings that will give exceptionally long, satisfactory service—it's HINES!

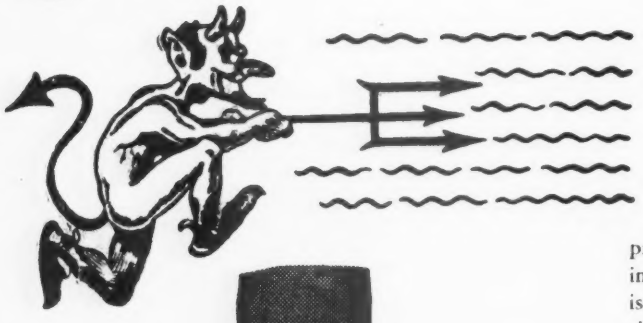
PINS AND BUSHINGS

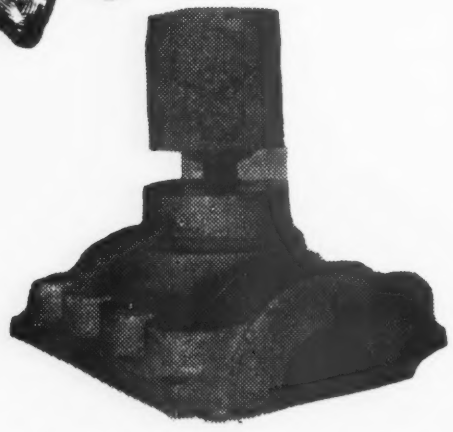
THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO • TELEPHONE: ORCHARD 1-2806

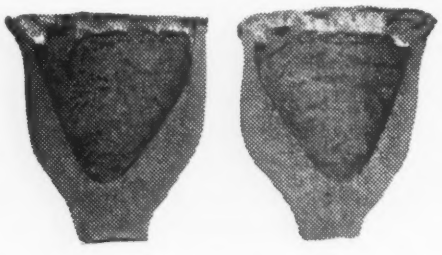
Circle 603 on Inquiry Card—Page 245

Soffel's





300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S *Carbon Free* LIQUIDIZER

With the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, this 6" x 6" chrome-nickel-steel riser was reduced in weight from 32 pounds to 13 pounds average. A savings of 19 pounds of salable metal, normally discarded as scrap, was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily, saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

THERMOTOMIC® COMPOUND and CARBON FREE LIQUIDIZERS

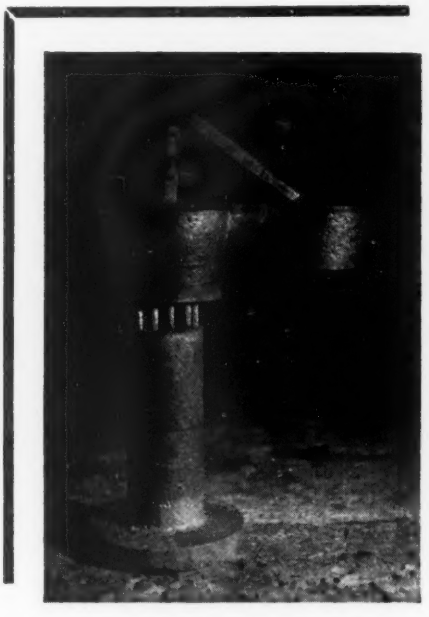
Keeps Metal Molten!

for Steel, Iron, Aluminum

Brass, Bronze, Copper

THERMOTOMIC "X" is a patented exothermic compound that produces a temperature over 3500° F. It can be molded or baked into any desired shape the same as sand cores. THERMOTOMIC "X" is used as knock off core rings with 1½ inch feeder opening under risers of feeding heads, also as insulating sleeves, inserts and facings, or mixed with facing sand where it is desired to maintain fluidity of the casting metal. Shorter and more compact heads and risers can be used. The small feeder opening permits easy removal of feeding heads and risers. In conjunction with THERMOTOMIC COMPOUNDS, we recommend the use of exothermic CARBON FREE LIQUIDIZER NO. 5 on top of the metal in the heads or risers as an insulating cover. For green sand casting molds, use THERMOTOMIC WP (Waterproof).

U. S. Patents No. 2,490,327 and No. 2,500,097



THERMOTOMIC *Strainer Core* PRODUCES MONEL CASTINGS 270 LBS. SOLID

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

PITTSBURGH METALS PURIFYING COMPANY

World's Largest Manufacturer of Fluxes and Purifiers For All Metals and Alloys

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

SAND AND FLOUR

- Domestic and Australian zircon foundry sands
- Zircon foundry flours in 200 and 400 mesh particle sizes

Orefraction Inc.

7433 THOMAS ST., PITTSBURGH 8, PA.

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CANADIAN HANSON & VAN WINKLE CO., LTD., F. B. Stevens Division, Windsor; Toronto

Circle 605 on Inquiry Card—Page 245

FOUNDRYGIANT Glass Fabric Belt

"Lasts six times longer than other belts,"

SAYS BIG CALIFORNIA FOUNDRY

This 18" U.S. FoundryGiant conveyor belt carries reclaimed sand under extreme outside heat conditions. So far, it has lasted *six times longer* than any previous belt on this job. Foundry executives expect there's a lot more life still in the belt.

A second U.S. FoundryGiant glass fabric belt carries extremely hot shakeout sand back to the reclaiming system. Both belts are delivering services far beyond what the foundry executives expected of conveyor belts.

The quality and durability built into all products made by "U.S." for the foundry industry lower maintenance and overhead costs. These "U.S." products—along with skilled engineering service—are obtainable at any of the 28 "U.S." District Sales Offices, at selected distributors or write U.S. Rubber, Mechanical Goods Division, Rockefeller Center, New York 20, N. Y.

Mechanical Goods Division

United States Rubber

Open the Door to Greater ACCURACY

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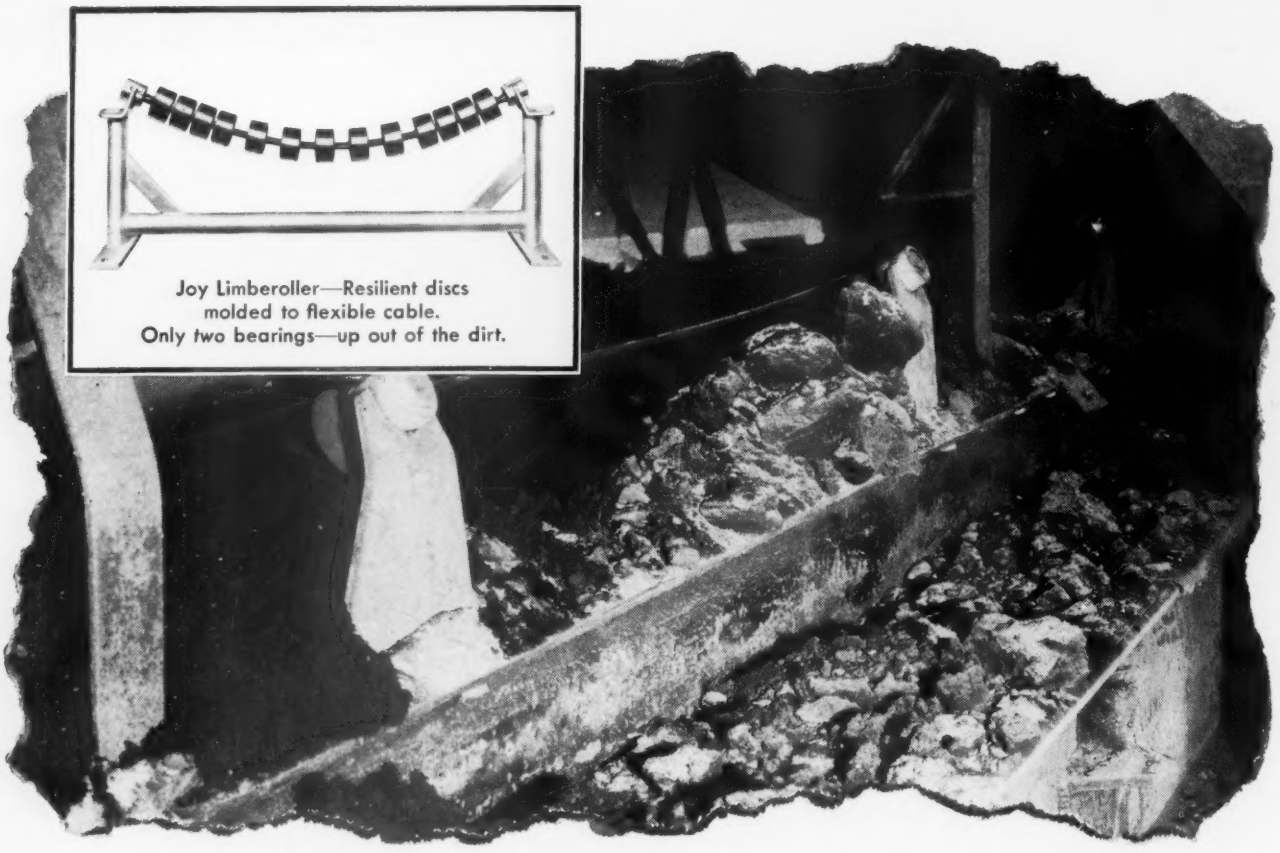
WRITE FOR PRICE SHEET

ACCURATE MATCH PLATE CO.
1847 W. CARROLL AVE. • CHICAGO 12, ILLINOIS

Circle 607 on Inquiry Card—Page 245



Joy Limberoller—Resilient discs molded to flexible cable. Only two bearings—up out of the dirt.

IN THIS FOUNDRY'S SAND CONVEYOR, JOY IDLERS LAST *TWELVE* TIMES LONGER

THREE YEARS IN SERVICE Joy Limberollers . . . unique, 2-bearing, suspension idlers for belt conveyors . . . have successfully operated in a Midwestern magnesium foundry since February, 1953. They are still going strong after giving twelve times the three-month life of conventional idlers.

SUPPORT 30"/30' BELT The Limberollers were installed on a conveyor belt which carries molding sand from a chute, up a 35° inclined plane, to a transverse belt.

NO BEARING FOULING The bearings are up out of the sand, unaffected by spillage. Fouled bearings, which stop the idler roll and cause damage to the belt, are no longer a problem.

EASY MAINTENANCE There are only two bearings on each idler . . . and that makes the maintenance men happy. They also like the ease with which the Limberoller can be removed . . . without stopping material flow . . . if and when maintenance becomes necessary.

MANAGEMENT HAPPY Such satisfactory service is welcomed by the foundry management. You will be pleased, too, when you discover how the Limberoller can increase efficiency of your belt conveyor operation. For details, see your Joy representative, or write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada. *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 62-13

Consult a Joy Engineer

about

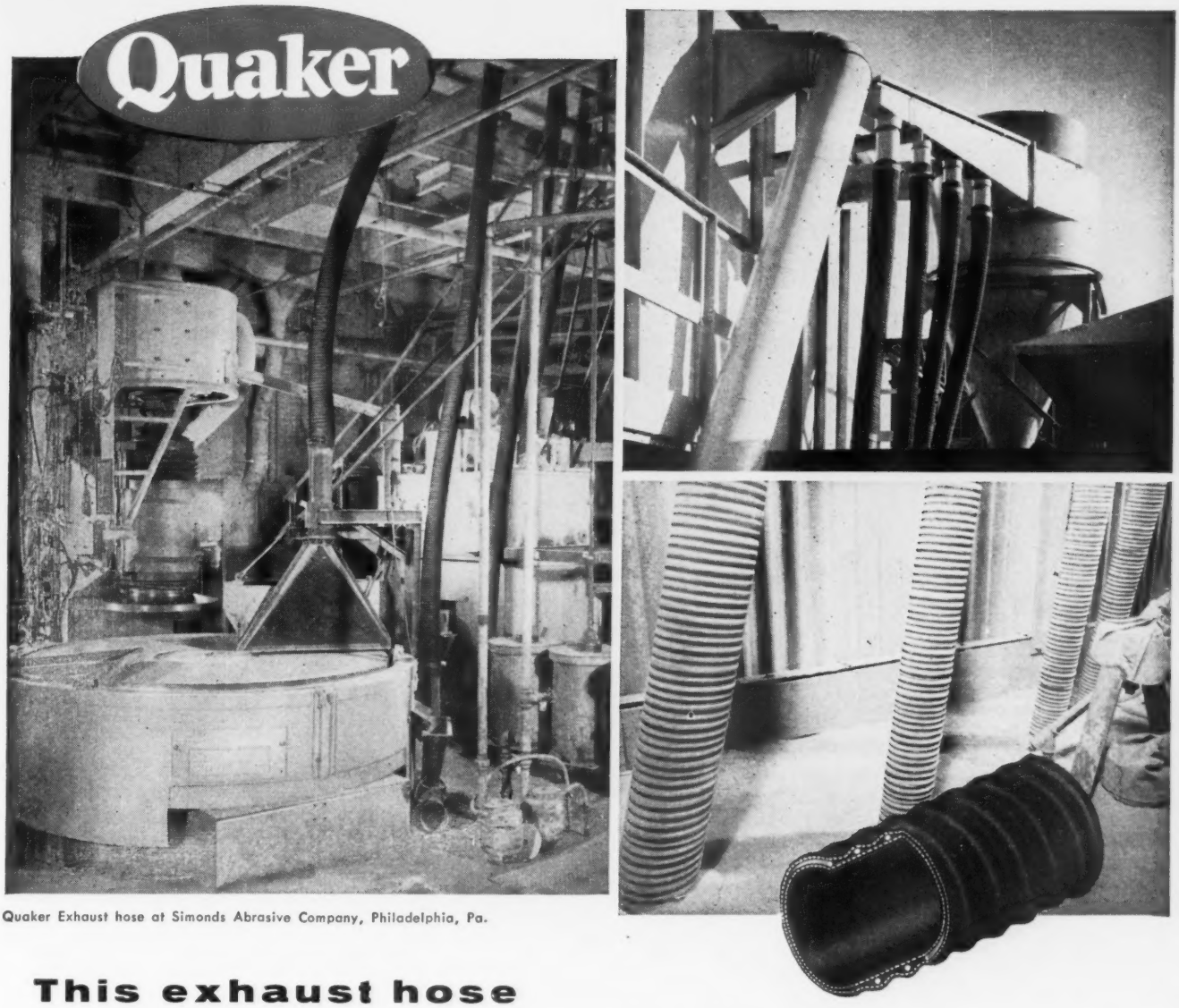
LIMBEROLLER

THE IDLER WITH FLEX APPEAL

WSW 15503-62

JOY

SINCE 1851—OVER 100 YEARS OF ENGINEERING LEADERSHIP



Quaker Exhaust hose at Simonds Abrasive Company, Philadelphia, Pa.

This exhaust hose already 4 times longer lasting in this grinding wheel plant...

Your Quaker-Quaker Pioneer distributor can supply not only your standard needs —but also your highly specialized ones. You'll find him a prompt dependable money-saving source for everything you need in rubber products. Write for free brochure and name of your nearest distributor.

Continuous handling of abrasive dust and steel shot calls for an exhaust hose of proven stamina. This Quaker hose has it. Even after 6 months of steady use by this grinding wheel manufacturer, it is still standing up to the wearing effects of abrasive particles—as compared to 6 weeks service by previously-used hose. It is specifically made for such tough service. Tube is specially compounded abrasive-resistant stock. Extra strength is provided by two plies of sturdy fabric and a helix of flat steel wire. Cover resists aging and is corrugated to give ready flexibility for bending around sharp corners. In lengths up to 50 feet. For lasting service specify Quaker-Quaker Pioneer exhaust hose.

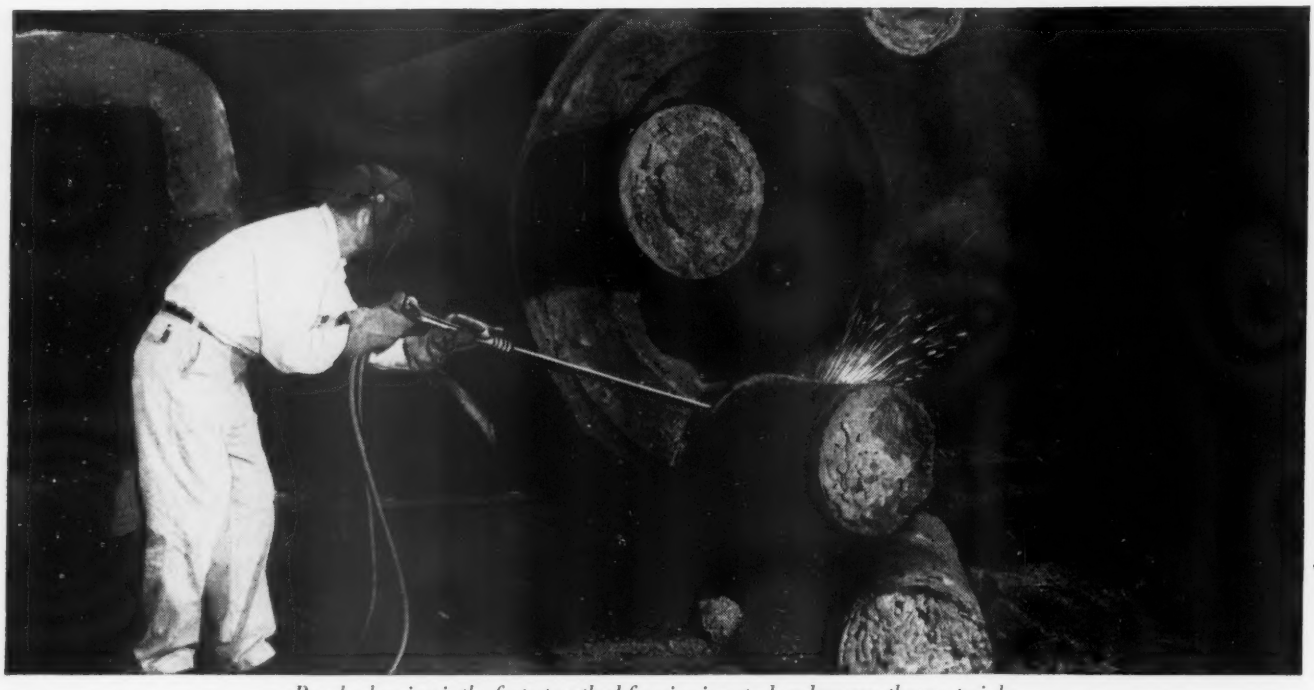
DIVISIONS OF HKP H. K. PORTER COMPANY, INC.

H. K. PORTER COMPANY, INC.

QUAKER RUBBER DIVISION
Philadelphia 24, Pa.

QUAKER PIONEER RUBBER DIVISION
San Francisco 7, California

From 5 days to only 4 hours...



Powder-lancing is the fastest method for piercing steel and many other materials.

Using a powder-lance, it took one man only 12 hours to make a 3 ft. diameter hole in this 2 ft. thick slag pit wall.

Powder-lancing speeds steel mill operations

Once it took 2 men 5 days to chip away four 10 in. diameter risers on ingot molds like the one shown here—but these four risers were removed in only 4 hrs. using a powder-lance. . . . The removal of 6 in. diameter risers from another mold was speeded from 3 days to only 30 minutes.

In still another operation, a 3 ft. diameter hole was cut through the 2 ft. thick concrete wall of a blast furnace slag pit in only 12 hours. Cost savings were more than 50 per cent over previous methods.

Powder-lancing is the fastest method for piercing holes in concrete, cinder block, fire brick, blast furnace refractories, steel and cast iron containing inclusions, and sand and metal incrustations.

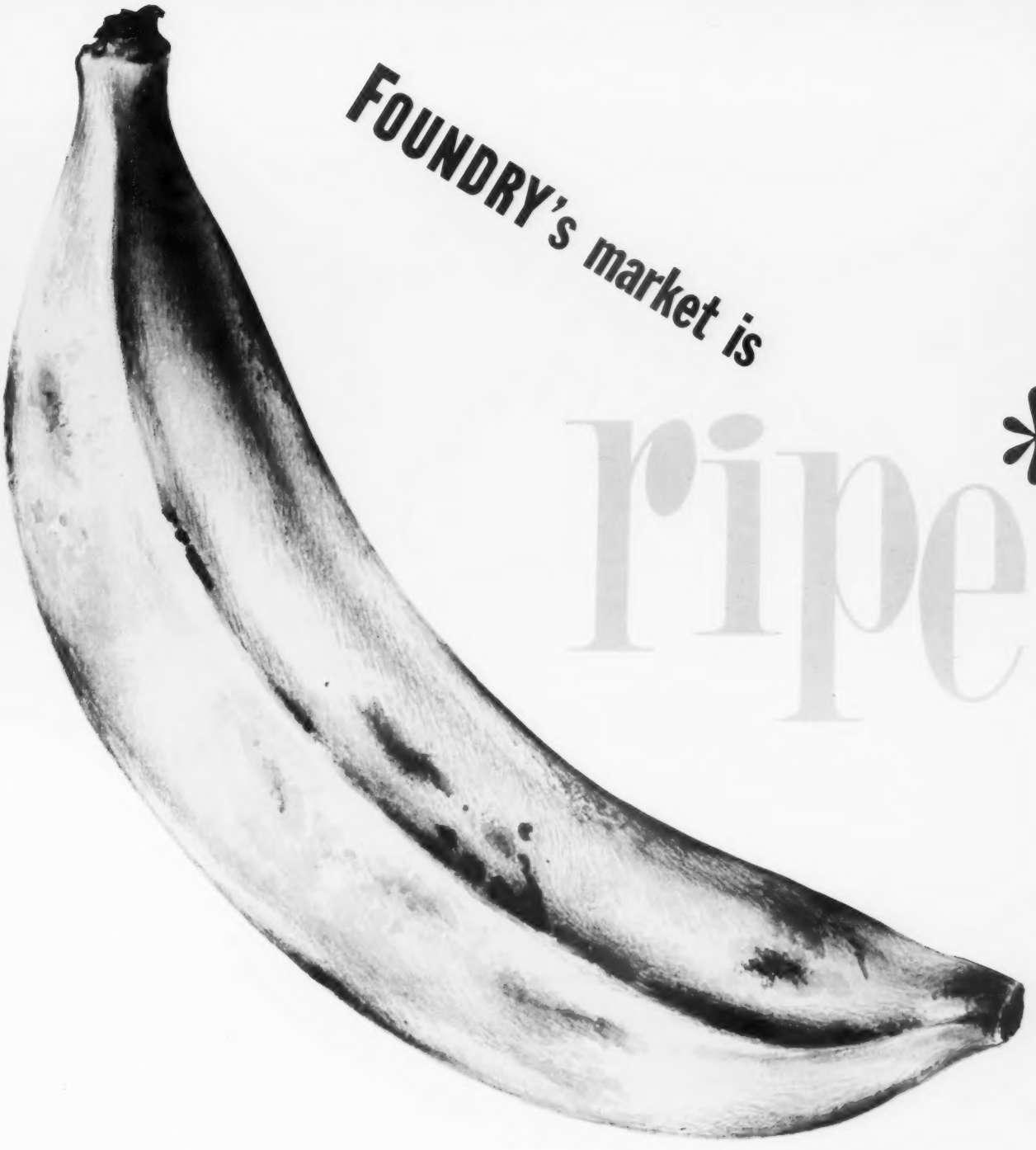
Cut costs, and speed production and maintenance in your mill . . . Call your local LINDE representative for more information on efficient, high speed powder-lancing. Start saving now, call him today.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

Linde
Trade-Mark

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

FOUNDRY's market is ripe*



The need for castings is on the upswing . . . as a basic industry, FOUNDRY's market grows as the population grows—rises as the standard of living rises.

66,000 readers rely on FOUNDRY for news about equipment, materials and supplies to keep the nation's foundries in full production.

Modernization and mechanization are essential if foundries are to produce larger tonnages of castings economically.

Only FOUNDRY offers you a complete Sales Development Service to help you get more business from foundries. Let's discuss the exciting possibilities now.

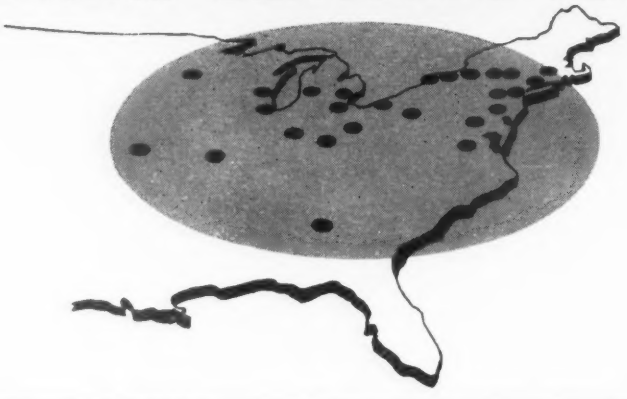
FOUNDRY

You do more business with foundries

when you advertise in FOUNDRY!

a PENTON Publication Penton Building, Cleveland 13, Ohio

DISTRIBUTORS-CENTERED FOR SERVICE!



When warehouse quantities of Iron Foundry Alloys are required in a hurry – there's a Vanadium Corporation Distributor right in your area

Adequate stocks of Vancoram products for every foundry need are within easy reach of you. For fast service, call your nearest warehouse.

STEEL SALES CORP. – Chicago, Detroit, Milwaukee, Indianapolis, Grand Rapids, Minneapolis, St. Louis, Kansas City, Mo.

WHITEHEAD METAL PRODUCTS COMPANY, INC. – New York City, Buffalo, Syracuse, Albany, Schenectady, Rochester, New Haven, Philadelphia, Baltimore, Harrison, N. J., Cambridge, Mass., Richmond, Va.

WILLIAMS & COMPANY, INC. – Pittsburgh, Cleveland, Cincinnati, Columbus, Toledo.

J. M. TULL METAL & SUPPLY CO. – Atlanta, Ga., Jacksonville, Tampa, Miami, Fla.

VANCORAM PRODUCTS FOR THE IRON FOUNDRY INDUSTRY

FERROCHROMIUM – High Carbon, Low Carbon, EXLO®, Ferrochrome silicon.

FERROSILICON – All grades.

FERROTITANIUM – High Carbon, Medium Carbon, Low Carbon.

FERROVANADIUM – All grades.

SPECIAL ALLOYS – Graphidox No. 4, V-5 Foundry Alloy, Noduloy alloys.

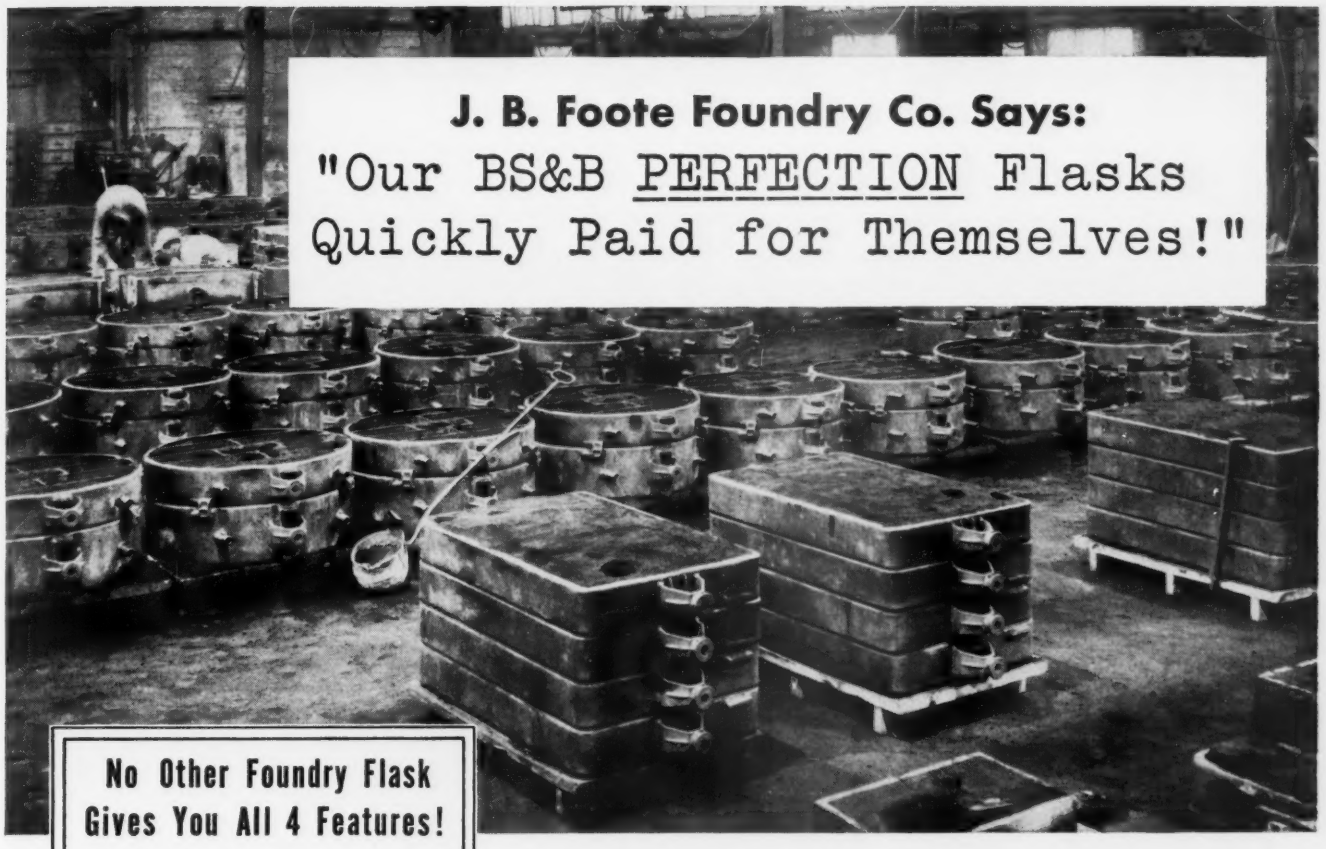
BRIQUETTES – Ferrosilicon, Ferrochromium, Ferromanganese, Silicomanganese.

Our 50 Years of Progress
1906 - 1956

There's Always That Extra Margin of Quality in the Vancoram Green Drum

VANADIUM CORPORATION OF AMERICA

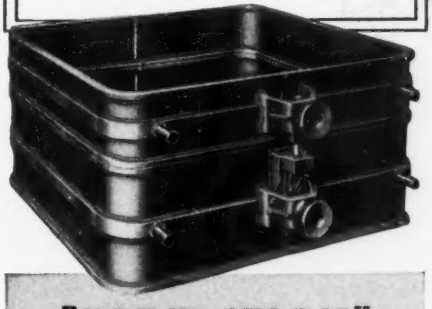
420 Lexington Avenue, New York 17, N. Y.
Pittsburgh • Chicago • Cleveland • Detroit
Producers of alloys, metals and chemicals



J. B. Foote Foundry Co. Says:
"Our BS&B PERFECTION Flasks Quickly Paid for Themselves!"

No Other Foundry Flask Gives You All 4 Features!

1. Continuous welding of bearing strips — inside and out.
2. Cast steel trunions.
3. Cast steel pinlugs and clamplugs.
4. Elimination of corner stresses.



"PERFECTION" Flasks—

Designed By Foundrymen For Foundrymen!

PERFECTION'S PERFECT FIT AT PARTING ELIMINATES ALL LOSS FROM RUN-OUTS!

In 1951 a small grey iron foundry in Fredericktown, Ohio, set out on a complete expansion and modernization program. Today, that foundry is a modern, completely integrated unit using the latest and best in foundry equipment . . . including BS&B "PERFECTION" Foundry Flasks.

We refer, of course, to the J. B. Foote Foundry Co. which, in addition to manufacturing their own UTILITY MIXER, also does general jobbing business in light grey iron castings for other firms.

Both Mr. Jack Fearn, Vice President, and Mr. Russell Ryan, Foundry Supt., are enthusiastic about the results they're getting from their "PERFECTION" flasks. They like the way these flasks are ruggedly constructed to *eliminate corner stresses*, thereby preventing the corners from cracking and breaking out. They like the perfect fit of "PERFECTION" flasks at parting, which eliminates loss from run-outs. They'll tell you that their "PERFECTION" flasks have more than paid for themselves in a short time, and that they have now standardized *exclusively* on BS&B "PERFECTION"!

If you'd like more information on how "PERFECTION" Foundry Flasks can help you get better castings at lower cost, we'll gladly send it without obligation. Address your inquiry to . . .

EFFICIENCY · OVER 60 YEARS · BS&B · RELIABILITY · ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Foundry Flask Division — Dept. 7-AR5

7500 East 12th Street Kansas City 26, Missouri

Circle 612 on Inquiry Card—Page 245

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

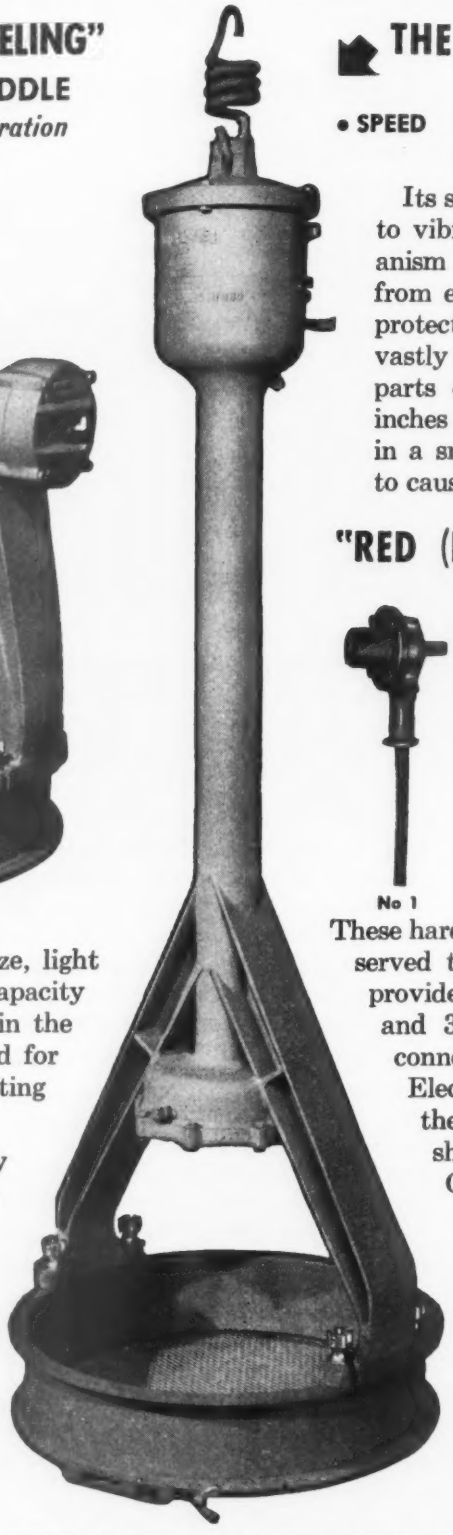
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



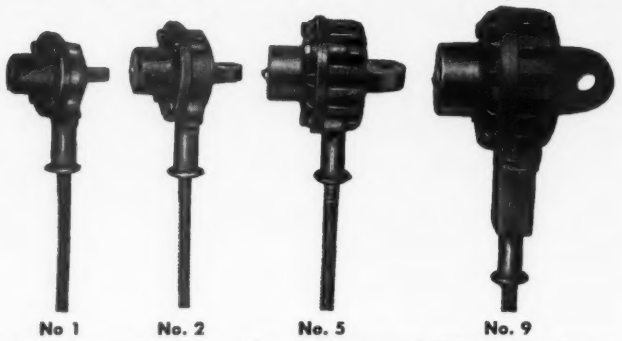
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

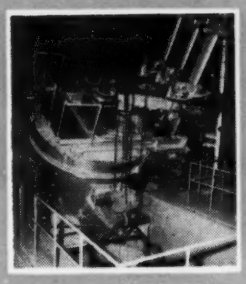
2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Circle 613 on Inquiry Card—Page 245

Circle 614 on Inquiry Card→

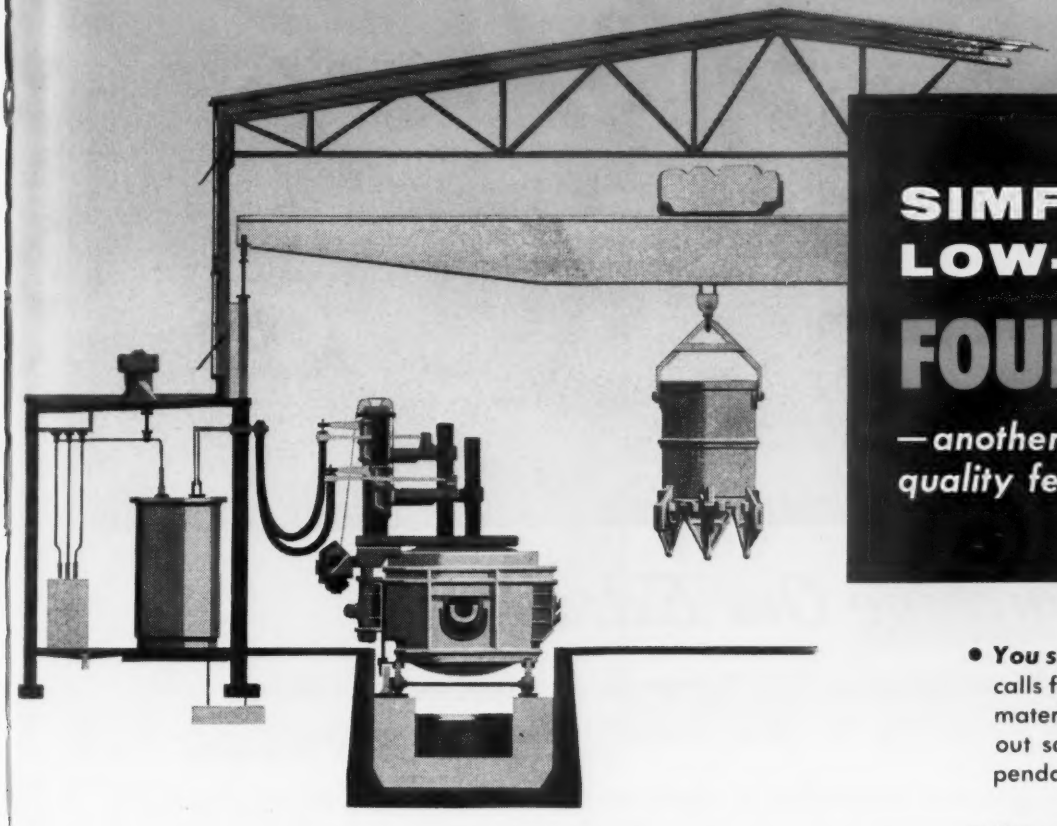
• ONE OF A SERIES OF MESSAGES TO MODERN FOUNDRY MANAGEMENT



SWINDELL

SINCE 1850

FOUNDRY ELECTRIC MELTING FURNACES



SIMPLE, LOW-COST FOUNDATIONS

—another SWINDELL quality feature

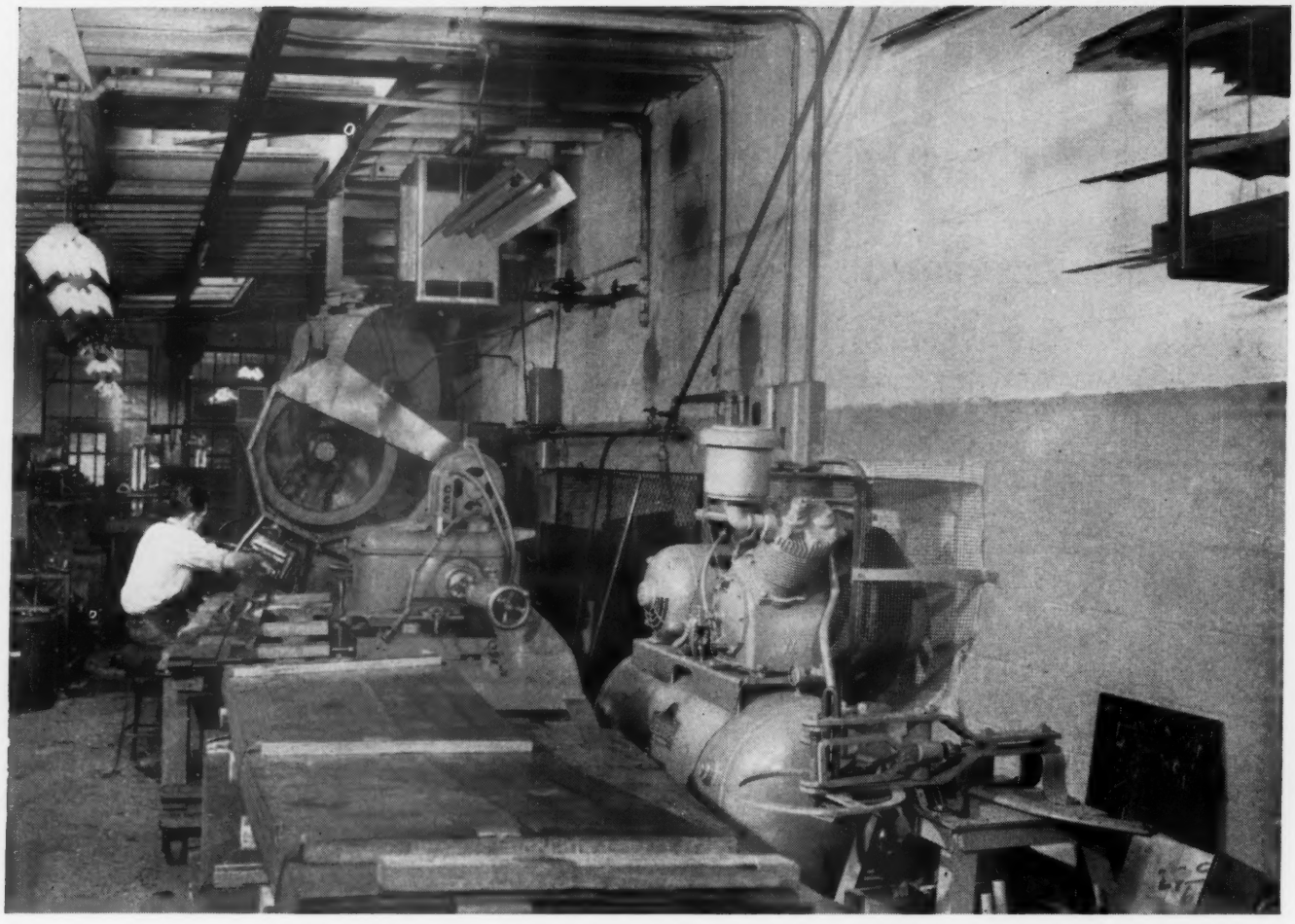
- ***You save*** because Swindell design calls for a minimum of excavation, materials and waterproofing, without sacrifices of strength and dependability.
- ***You save*** because Swindell simplicity sharply reduces construction time.

Because SWINDELL's electrode hoist mechanism is on the furnace, cable tunnels and oil piping trenches are eliminated. Because the roof cylinder is integral with the furnace, no special concrete foundation is required. And where trunnion-type furnaces are specified, our hydraulic cylinders are floor-mounted, avoiding potentially fire-hazardous cylinder pits. • Such simplicity and savings are carried through on the component furnace features. At every point, Swindell know-how serves you!

SWINDELL Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.

WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog — sent promptly on request.

SWINDELL-DRESSLER
CORPORATION
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

W-102

LE ROI *Division of Westinghouse Air Brake Co.*

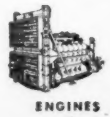
Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS

TRACTAIR

STATIONARY AIR COMPRESSORS

AIR TOOLS


ENGINES

Circle 615 on Inquiry Card—Page 245

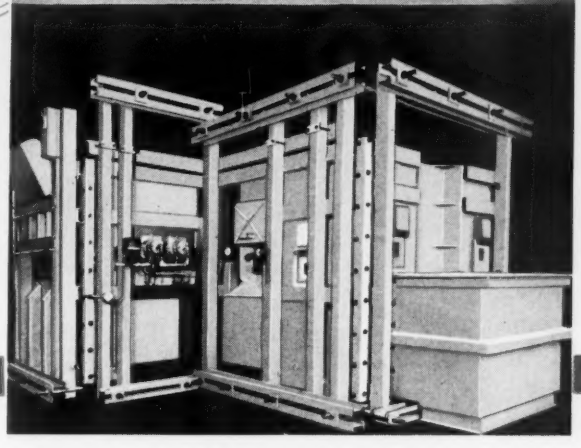
Circle 616 on Inquiry Card→

WANT TO MELT A MOUNTAIN OF METAL?

THESE BIG STROMANS WILL DO IT...BUT FAST!

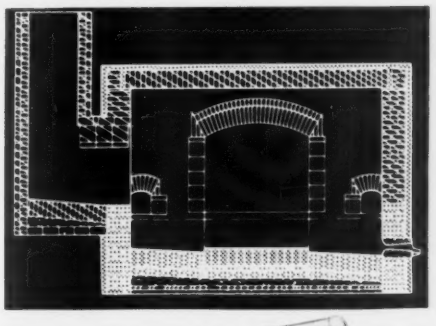
STROMAN LARGE SIZE REVERBERATORY FURNACES

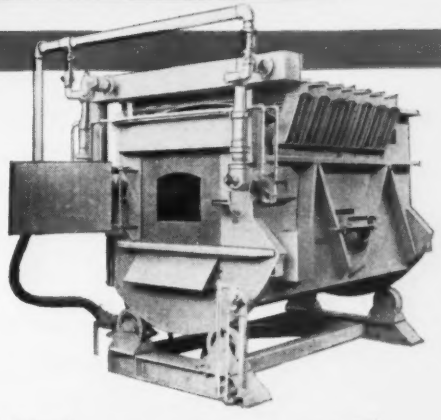
For Melting Unlimited Capacities of Aluminum, Zinc or Brass



These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country, they have proved their ability to deliver large tonnages of metal, are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority.

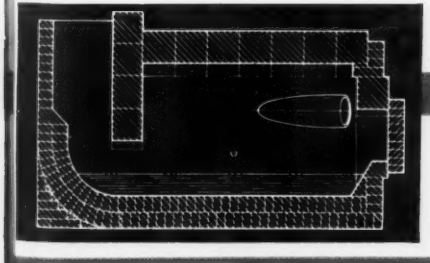
Furnaces of this type are designed to meet customers' individual requirements . . . let our engineers show you how to achieve utmost efficiency and economy in your melting operations.



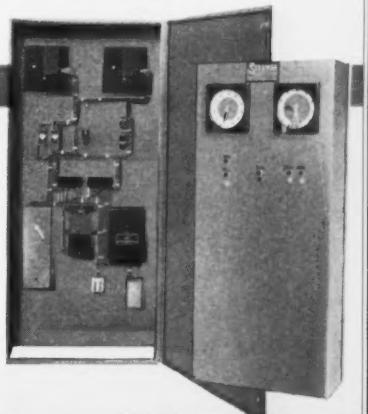


STROMAN TYPE "SW" CRADLE TILTING FURNACE FOR ALUMINUM MELTING SIZES FROM 1,000 TO 3,000 POUNDS

An ideal furnace for breakdown to supply hot metal to holding furnaces for die casting or permanent mold. Also for distribution to the molding floor in sand casting foundries. Tilted by means of an air or hydraulic ram. Furnished complete with gas or oil burners or combination burners, blower to furnish combustion air, and lining made of standard fire brick shapes.



Automatic temperature and safety controls available if desired.



STROMAN CUBICLE TYPE CONTROL PANEL

Stroman design monitor for furnace metal temperature, refractory temperature, high limit blower motor, circuit, electric ignition, and flame safety control, with completely automatic built-in warning system.

Don't forget STROMAN make furnaces for the melting of brass, bronze, aluminum, magnesium, grey iron and all other metals in sizes to meet your needs no matter how large or small.

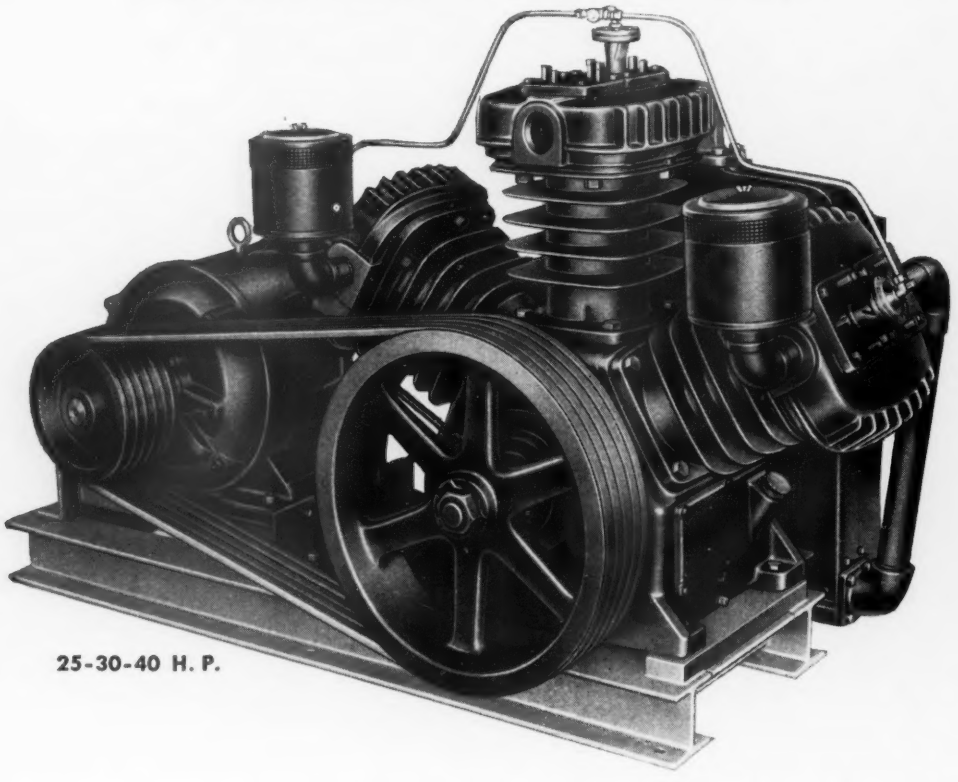
Write for complete catalogue today!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF THE PETERSEN OVEN CO. • FRANKLIN PARK, ILL.

THE NEW CURTIS MODEL C-100
TWO-STAGE, AIR-COOLED AIR COMPRESSOR

Provides Higher Operating Efficiency
Costs Less to Install



25-30-40 H. P.

THIS NEW Curtis Two-Stage will deliver more air per minute, per horsepower and per kilowatt hour of electrical energy consumed, thus assuring a saving in your electrical bill.

It's Air Cooled, thereby eliminating expensive water bills and assuring quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

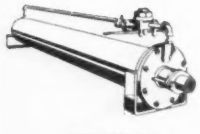
For complete information write for illustrated folder.

Remember, you can count on . . . OUR 102nd YEAR

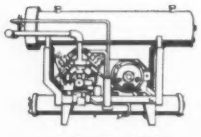
Curtis

MANUFACTURING COMPANY • PNEUMATIC DIVISION

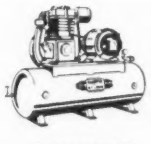
1922 KIENLEN AVE. • ST. LOUIS 20, MO. CM-6



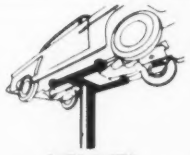
AIR HOISTS
AIR CYLINDERS



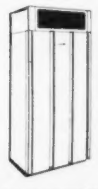
PACKAGED LIQUID CHILLERS



AUTOMOTIVE AIR COMPRESSORS



AUTO LIFTS



PACKAGED AND REMOTE AIR CONDITIONING

Circle 617 on Inquiry Card—Page 245

Circle 618 on Inquiry Card→

Want to net big grinding savings? Let Peninsular analyze your jobs

Grinding savings of both time and money often are hidden in unsuspected places. Peninsular Abrasive Engineers can quickly flush them into the open by making a comprehensive analysis of your complete operation. Their reports already have netted thousands of dollars a year for plants across the country.

For example, in a typical snagging operation like the one at left, only 700 lbs. of stainless steel were being removed per hour, at a cost of $18.20 per ton ground. A new Peninsular-engineered wheel increased hourly production to 821 lbs. Cost per ton dropped 22%, to $14.06; labor overhead was drastically reduced, and 38% more metal was removed per wheel.

Call, write, or wire us today.

Resinoid and Vitrified Grinding Wheels

PENINSULAR

GRINDING PENINSULAR **WHEELS**

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS COMPANY—DETROIT, MICHIGAN

BY POPULAR DEMAND!

fine FANNER King Size

SCAB NAILS

with these "wanted" features

Cover FOUR TIMES the area, of conventional large head foundry nails

Requires 1/4 of labor-setting time

Lighter weight — more pieces per pound

Provides greater sand retention

Produce better castings

Available in 1" round or square head
Sizes: 7/8" to 2 1/2" long
Coppered or Tinned

Fine FANNER King-Size Scab Nails shown here are actual size

● Foundrymen everywhere are hailing the arrival of a new "king" — Fine FANNER King-Size Scab Nails. New FANNER King-Size Scab Nails can be placed on the pattern and rammed, eliminating hand setting of nails after pattern has been rammed. Square head King-Size Scab Nails can be grouped together to completely cover a given area . . . can be used to excellent advantage at gate areas. Molds can be nailed or covered right into the corner with the square head. FANNER King-Size Scab Nails can also be used as chaplet bearing surfaces in green sand molds. For better castings at lower cost, use these new FANNER King-Size Scab Nails — write for samples and prices today!

THE FANNER MANUFACTURING CO.
Brookside Park **Cleveland 9, Ohio**

5 REASONS FOR CLEVELAND TRAMRAIL CORE-HANDLING EQUIPMENT

Above: After baking the racks are taken directly to molding floor. No time-consuming rehandling of cores.

Below: Coremakers' plates of cores are placed on racks conveniently located. When racks are loaded, they are propelled into ovens.

1 ELIMINATES REHANDLING — Delivers cores from coremaker to oven, thence to molding floor, via overhead tramrail route without rehandling.

2 CUTS COSTS — Saves time, speeds production, cuts costs. Coremakers spend more time making, less time handling cores.

3 REDUCES BREAKAGE — Easy operating carriers on smooth overhead track eliminate damaging vibrations and shocks. No chafing, cracking, or breaking of cores in transit.

4 NO REINFORCEMENT WIRES — Because of cushion-like handling with Cleveland Tramrail reinforcement wires can be eliminated for many cores. (Removing core wires sometimes costs more than cores themselves.)

5 WITHSTANDS OVEN TEMPERATURES — Cleveland Tramrail carriers are designed for usual oven temperatures up to 450 degrees F. No "sticky" wheel bearings.

Cleveland Tramrail core-handling equipment is inexpensive. It is easy to install in present plants. It is ideal for use through continuous baking ovens.

Now is the time to consider establishing real efficiency in your core department. Have an experienced Cleveland Tramrail sales engineer offer you recommendations — no obligation, of course.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3819 East 286 Street, Wickliffe, Ohio

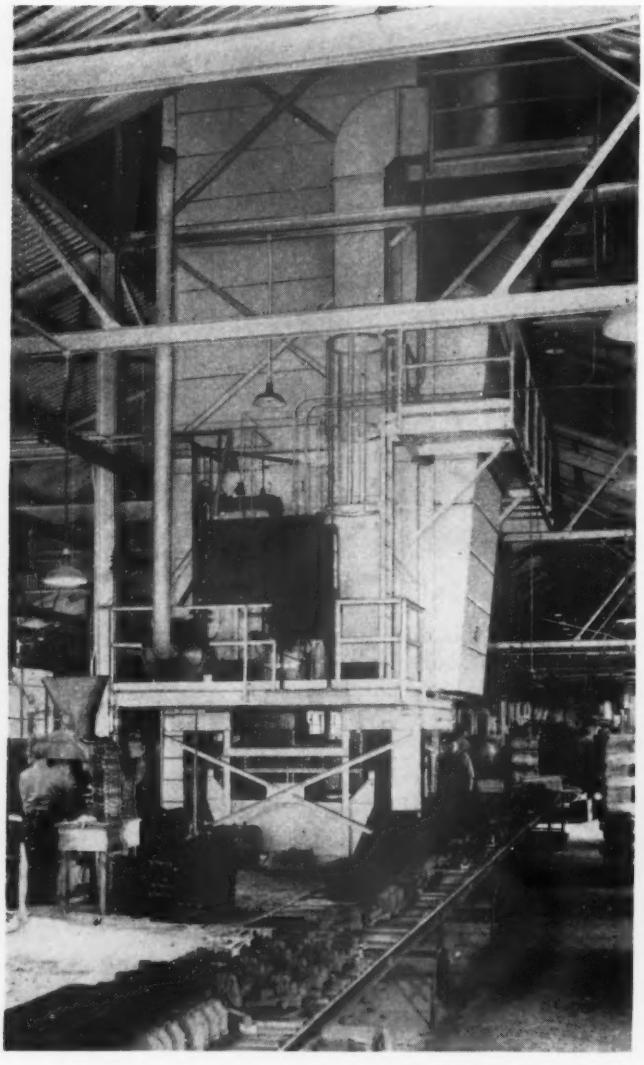
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Circle 620 on Inquiry Card—Page 245

COLEMAN

lead to

and



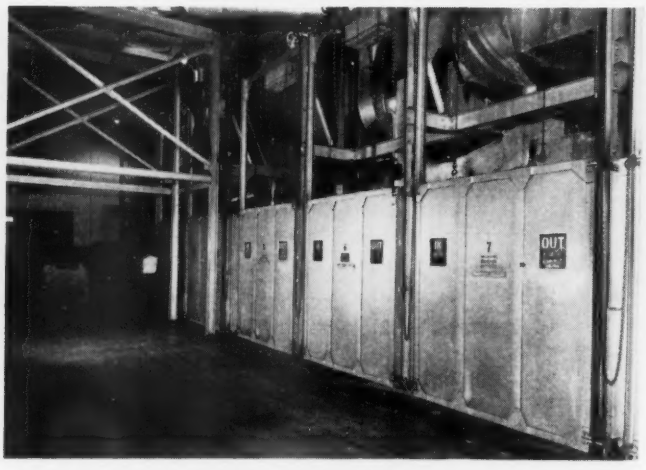
Coleman Tower® Oven

Your out-dated core and mold ovens may be costing you thousands of dollars . . . because they cannot provide the production savings you can realize from modern, efficient Coleman Ovens.

The exclusive advantages of Coleman Ovens are reflected in instant improvement in cores, molds and casting quality. In many installations the immediate reduction of scrap losses . . . and substantial savings in fuel, material and labor have enabled users to pay for a new Coleman Oven in less than a year.

Since production savings are so vital to your profits . . . isn't it worth your time *now* to investigate the advantages of Coleman Ovens. Our experienced engineers are available without obligation to give practical suggestions for your particular requirements.

WRITE FOR BULLETIN 54

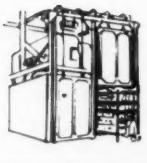


Coleman Transrack Ovens

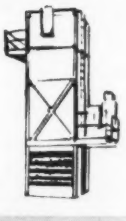
Let us recommend the RIGHT type of core or mold oven for your requirements — we make them ALL!

COLEMAN PORTABLE CORE OVENS

COLEMAN ROLLING DRAWER CORE OVENS



COLEMAN TRANSRACK CORE OVENS



COLEMAN TOWER CORE OVENS

OVENS

production savings

greater profits

Coleman Dielectric Oven

Only COLEMAN offers a complete line of foundry ovens with all these advantages

RECIRCULATING HEATING OR DIELECTRIC SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

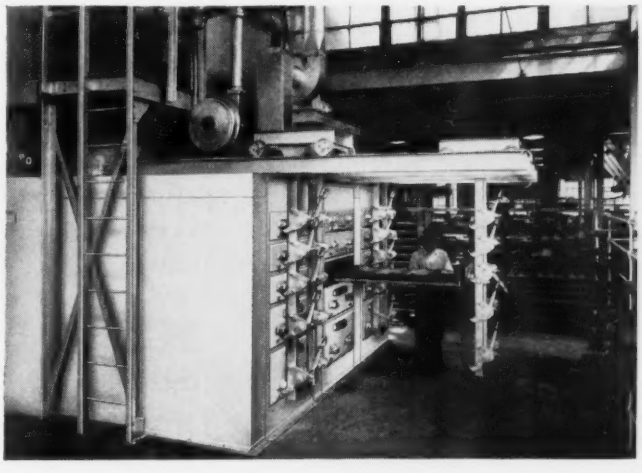
MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you — gas, oil, stoker-coal, electricity, etc.

FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders — whichever is most satisfactory for your requirements.

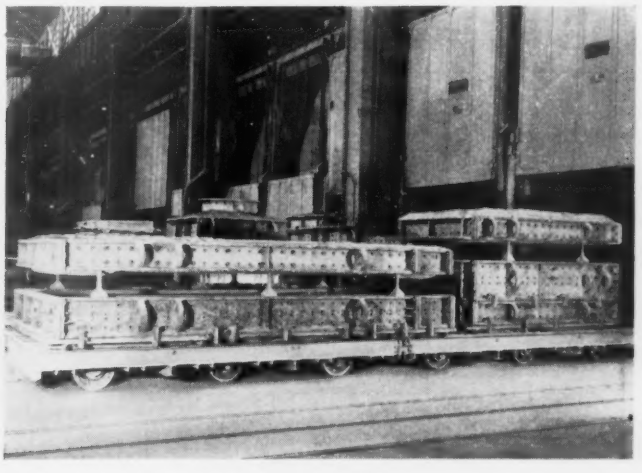
BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases — helps to make the core department a good place to work.

ADVANCED OVEN "KNOW-HOW". Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

WIDEST EXPERIENCE. Gained through more than half a century of specialization in foundry ovens and the building of over 11,000 successful Coleman Oven installations.



Coleman Rolling Drawer Ovens

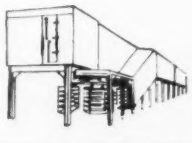


Coleman Car Type Mold Ovens

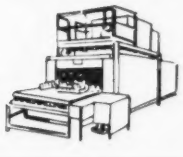
THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

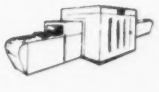
World's Oldest and Largest Foundry Oven Specialists



COLEMAN HORIZONTAL CONVEYOR CORE OVENS

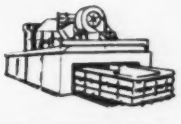


COLEMAN CONVEYOR REDRY OVENS

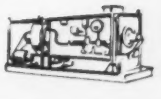


COLEMAN DIELECTRIC CORE OVENS

COLEMAN CAR-TYPE OVENS



COLEMAN HIGH-SPEED MOLD OVENS



COLEMAN PORTABLE MOLD DRYERS

DELTA
DRI-BOND BINDER

DEVELOPS

1. HIGHER TENSILE AND COMPRESSION STRENGTH...

2. GREATER WATERPROOFING PROPERTIES . . .

3. HIGHER GREEN STRENGTH AND HOT STRENGTH

IN CORE SAND

THAN ANY OTHER DRY BINDER TESTED

DELTA DRI-BOND BINDER is a product of several years of research and experimentation in our own sand research laboratory and proved by additional years of actual experience-in-use data compiled by prominent foundries. The excellent results obtained with Delta Dri-Bond Binder, reported by all sources, establish beyond question both the outstanding superiority and greater economy of this new product for use in steel, gray iron and non-ferrous foundries.

Cores made with Delta Dri-Bond Binder have excellent resistance to metal erosion, completely resist veining and metal penetration and shake out readily from the finished castings.

Get the Facts . . . Working samples and complete literature on Delta Dri-Bond Binder will be sent to you on request for test purposes in your own foundry.

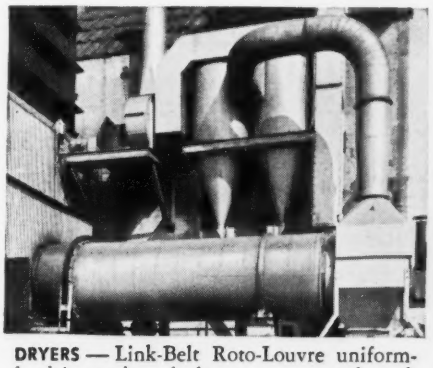
DELTA

DELTA OIL PRODUCTS CO.

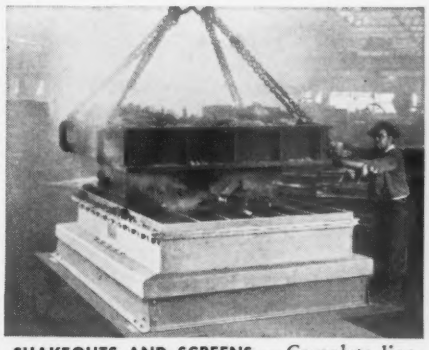
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

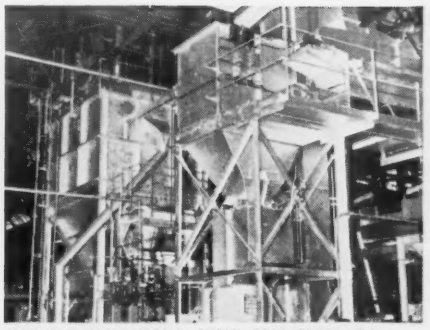
For handling sand and castings--



DRYERS — Link-Belt Roto-Louvre uniformly dries and cools large tonnages of sand. Floor space is conserved because no extra cooler is required.

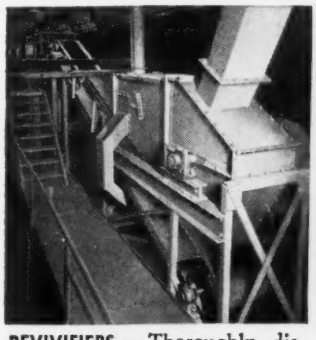


SHAKEOUTS AND SCREENS — Complete line provides centralized separation of sand and castings or sand screening for every type and size foundry.



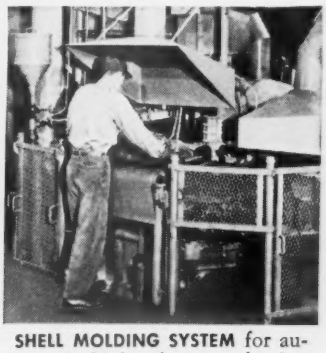
BUCKET ELEVATORS, BINS AND HOPPERS — Low-cost elevating and storage of sand. Sturdily built in a wide range of types and sizes.

LINK-BELT quality equipment...



REVIVIFIERS — Thoroughly disintegrate, blend, cool molding sand so it will ram to uniform density. Also remove shot.

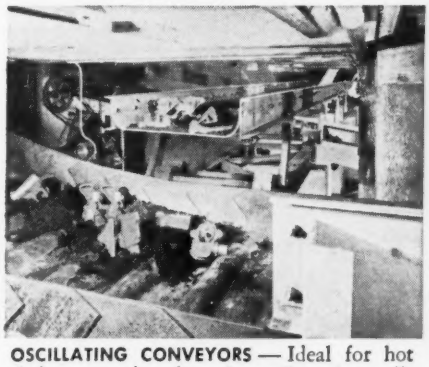
BELT CONVEYORS — Flat belt has plows to distribute sand to molders' hoppers. Troughed type used for other sand handling.



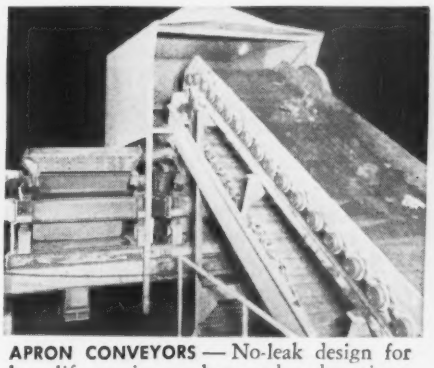
SHELL MOLDING SYSTEM for automatic, high-volume production of precision castings requiring little or no machining.

MOLD CONVEYORS — A full line of car, pallet, roller and trolley types meets all variations of foundry practice.

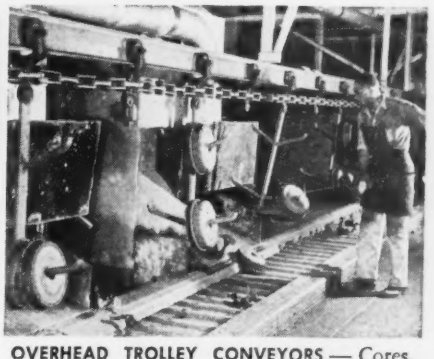
cuts your costs every step of the way



OSCILLATING CONVEYORS — Ideal for hot shakeout sand and castings. One-piece, all-metal trough eliminates wear, leakage. With screened trough section, acts as shakeout.

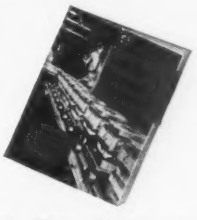


APRON CONVEYORS — No-leak design for long-life service on hot sand and castings. Operates in horizontal or steeply inclined paths. Also good as sorting conveyor.



OVERHEAD TROLLEY CONVEYORS — Cores, molds and castings are economically handled. Complete flexibility of path and capacity provided plus saving of floor space.

Ask your nearest Link-Belt office for new Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.



LINK-BELT

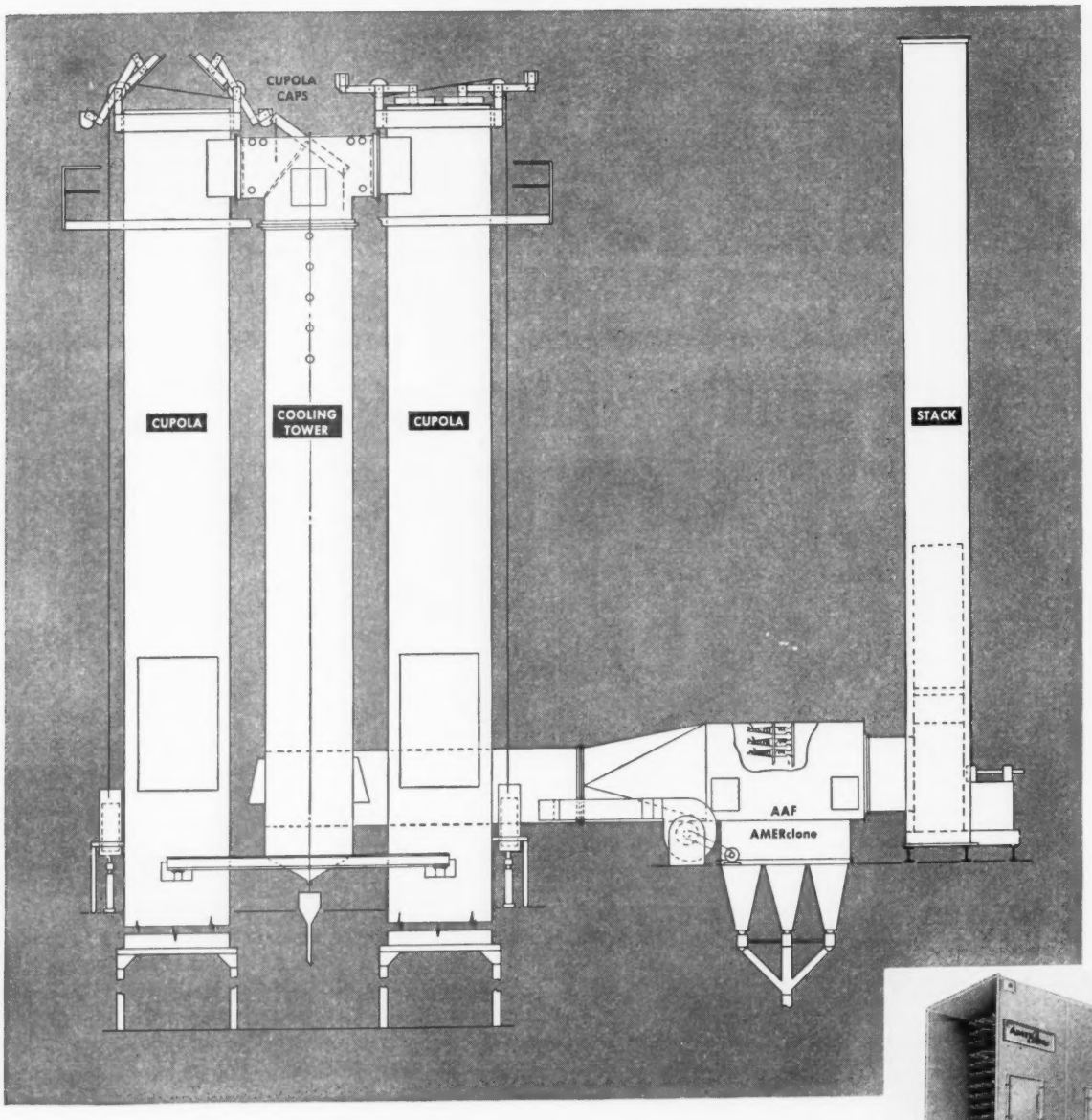
CONVEYORS AND PREPARATION MACHINERY

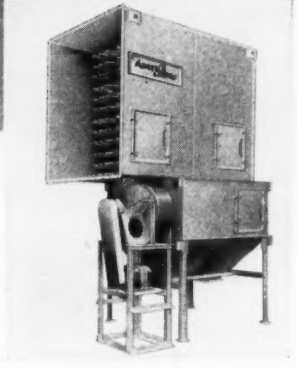
MEMBER FEMA

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.967

AAF AMERclone .... for CUPOLA Dust Control

CONCEIVED 1952 INTRODUCED 1955 PROVED 1956





Since its introduction just one year ago, AAF's AMERclone dust collection system has become an accepted solution for control of cupola dust. It *gets* the particles that cinder catchers *miss*—the *small* particles that create *big problems.*

One AMERclone system handles two cupolas alternately . . . permits full-time use of equipment. Dust and cinders are collected dry, which simplifies disposal and prevents corrosion of collection system.

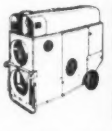
For complete information, call your nearest AAF representative or write direct for AMERclone Cupola Bulletin 292.

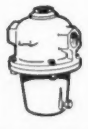
AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Herman Nelson Portable Heaters



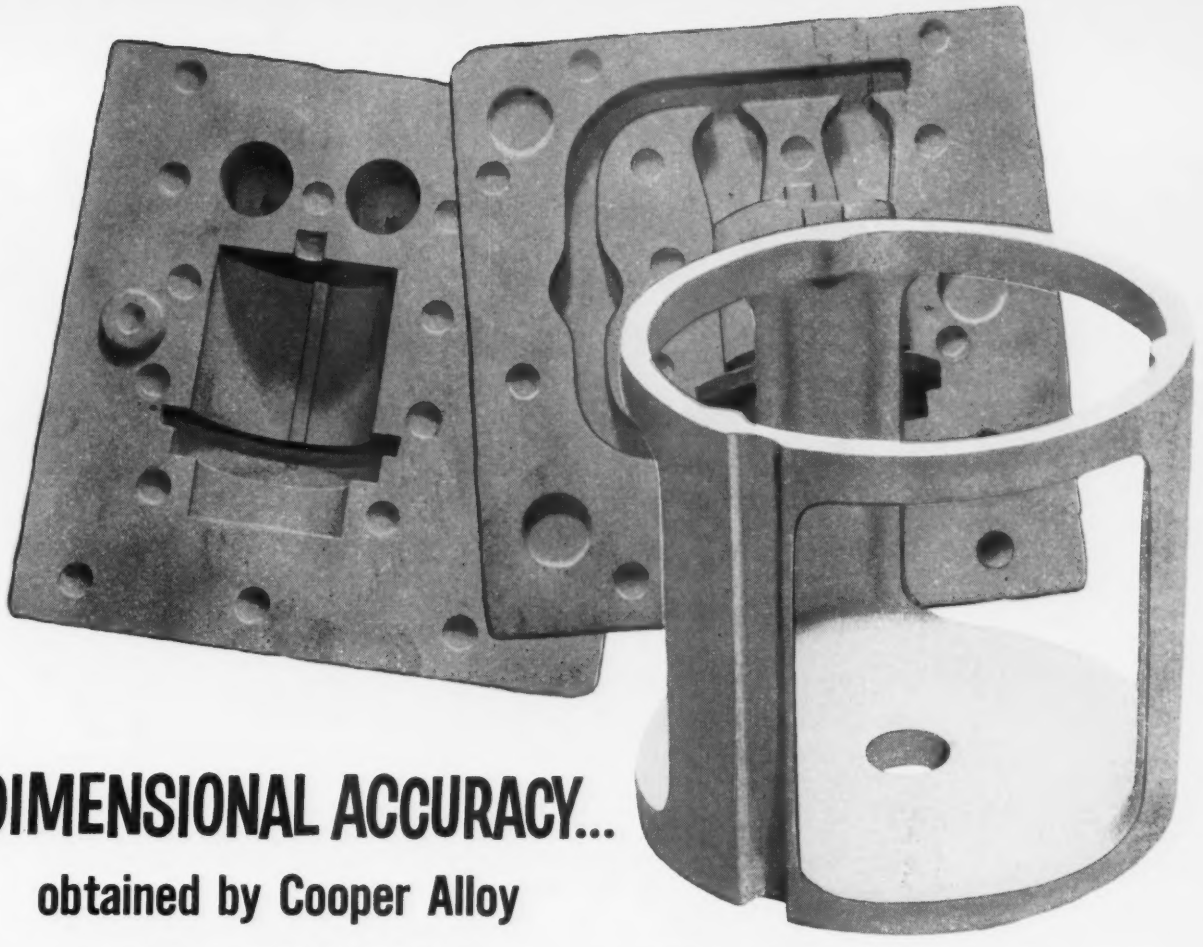


Illinois Heating Specialties

— BETTER AIR IS OUR BUSINESS —

AAF Electric Furnace Hoods

AAF Type K Exhauster



DIMENSIONAL ACCURACY...

obtained by Cooper Alloy

through SHELL MOLDING with G-E Shell Molding Resins

This stainless steel instrument housing, cast for a customer by Cooper Alloy Corporation, Hillside, N. J., was one of those "impossible" jobs. Previous experience by the customer had resulted in shrink defects in the lugs on the open face, rendering the castings unacceptable. The job was further complicated by the fact that dimensions and finish were equally critical on both exterior and interior surfaces.

Through shell molding and advanced foundry techniques, Cooper Alloy was able to convert this "impossible" job to a standard production run! Hollow shell cores achieved the required accuracy and finish for the casting's interior; the Shellcast* process accomplished similar results for the exterior. G-E shell molding resins helped Cooper Alloy obtain close dimensional accuracy, fine finish and uniform soundness.

How can shell molding help YOU?

Cooper Alloy uses *General Electric shell molding resins* in its Shellcast process, relying on them for batch-to-batch uniformity and correctly balanced properties. Other G-E products for shell molding include: *G-E silicone release agents* to release molds easily from patterns and *G-E phenolic bonding resin* to assemble shell halves together.

Progress Is Our Most Important Product

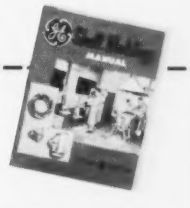
GENERAL ELECTRIC

Ask G. E. about shell molding!

General Electric maintains a shell molding laboratory in Pittsfield, Mass., to help users and prospective users of shell molding solve problems and evaluate the process. G.E. also offers a 28-page manual describing the techniques and benefits of this new foundry method. *Just mail the coupon for a free copy!*

*Reg. trademark, Cooper Alloy Corporation

FREE SHELL MOLDING MANUAL!



General Electric Company
Section 6F4A2
Chemical and Metallurgical Division
Pittsfield, Massachusetts

Please send me a free copy of *G-E Shell Molding Manual.*

( ) We are presently using the shell molding process.
( ) We are interested in the shell molding process.

Name_____

Firm_____

Street_____

City_____ Zone_____ State_____

Circle 625 on Inquiry Card—Page 245

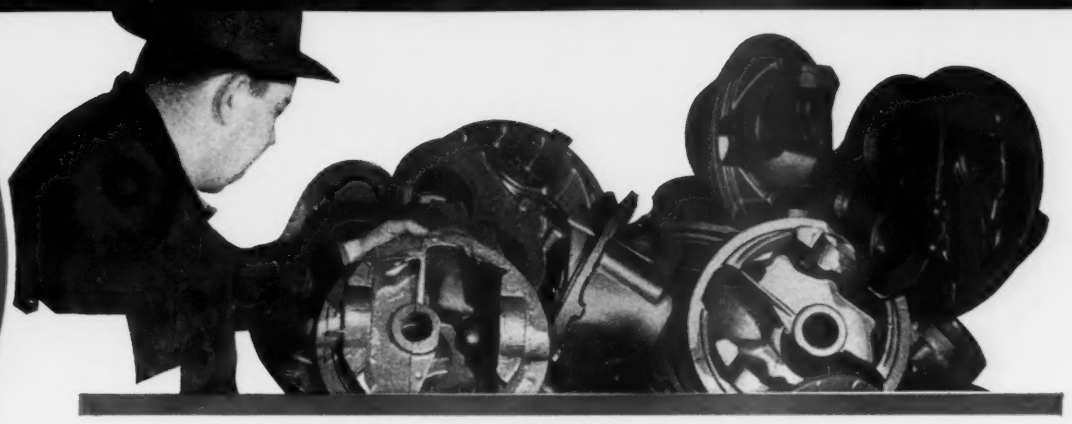
IN BATCH TYPE CLEANING

THE BIGGEST SAVINGS

ARE MADE WITH THE WHEELABRATOR®

SUPER-TUMBLAST

The o
blade
696 h
cleani
tons o
castin
cost o
2.2c
wheel



Even deep-cored work, like the parts shown here, are cleaned in just 12 minutes in the Super Tumblast

At Dayton Malleable Iron Co.

The WHEELABRATOR SUPER TUMBLAST

Cleaned 2827 tons of the toughest work as fast or faster than a 2-wheel machine and used *only one set of blades*

Saved 66.2% in blade costs

(Other Maintenance Costs Proportionately Low)

Saved 30% in Abrasive Consumption

The original blades lasted 696 hours, cleaned 2,827 tons of castings, at a cost of only 2.2c per wheel hour

The tremendous savings promised for the Wheelabrator SUPER TUMBLAST are being delivered in actual performance. At the Ironton Division of Dayton Malleable Iron Company, for example, maintenance savings have been outstanding . . . the maintenance foreman says: "this machine is designed for the maintenance man."

The new Super-efficient Abrasive Separator is perhaps the greatest single cost-saving feature of the Super Tumblast because it affects so many areas. Having 3 times the air separation area of the conventional separator, it provides more effective and uniform removal of all abrading contaminants from the abrasive system without removing usable abrasives. It assures that super-clean abrasive is fed to the wheel at all times.

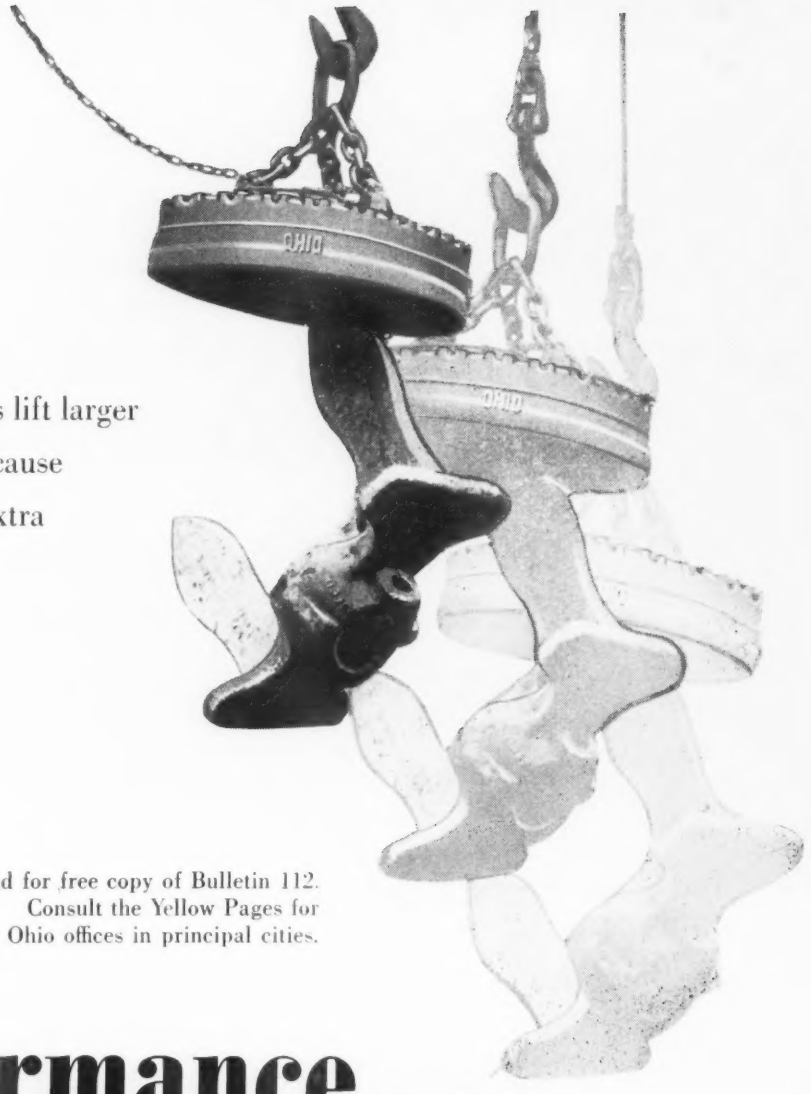
The Wheel itself is a new development of tremendous importance to cleaning economy because it throws more than twice as much abrasive as any similar sized wheel previously used. The wheel has new blades for longer wear, a strain-free blade holding device, a new easy-service guard housing, a new system of wheel guard liners . . . all designed to minimize maintenance.

Among the many other cost-reducing features designed into the Super Tumblast are the Super-tight Cleaning Chamber that prevents jamming of work, the Super-Sealed Door which prevents abrasive loss, and the use of Wheelabrator Long-Lyfe Parts at all high-wear points.

The Wheelabrator Super Tumblast will save YOU money . . . let us show you how. In the meantime, write for illustrated Brochure No. 125-D.

WHEELABRATOR
CORPORATION

505 S. Byrkit Street — Mishawaka, Indiana



Size for size, Ohio Magnets lift larger loads over longer periods because they *operate cooler*. So for extra magnet lifting power, extra magnet value—always specify Ohio Magnets and Ohio Magnet Controllers. There's a type and size for every lifting job.

Send for free copy of Bulletin 112. Consult the Yellow Pages for Ohio offices in principal cities.

for performance . . . it's Ohio Magnets

Ohio Bolted Magnets 12″ to 65″ diameter. 6-coil types in 39″ to 65″; 8-coil in 55″ and 65″. Strap copper coils over 39″. Bolts protected in recessed wells. Also capsule coil over 45″.

Ohio Welded Magnets 39″ to 65″ diameter. Lightweight models in 39″ and 45″. 6-coil types in 46″, 55″, 65″; 8-coil in 55″ and 65″. Welded on top where it can't get dented in. Also capsule coil over 45″.

Ohio Basket Magnets 55″ and 65″ 4-coil, and 65″ 6-coil. For extra heavy-duty service; hefty ears project beyond magnet diameter, ward off damaging blows. No weight carried by bolts. Also capsule coil over 45″.

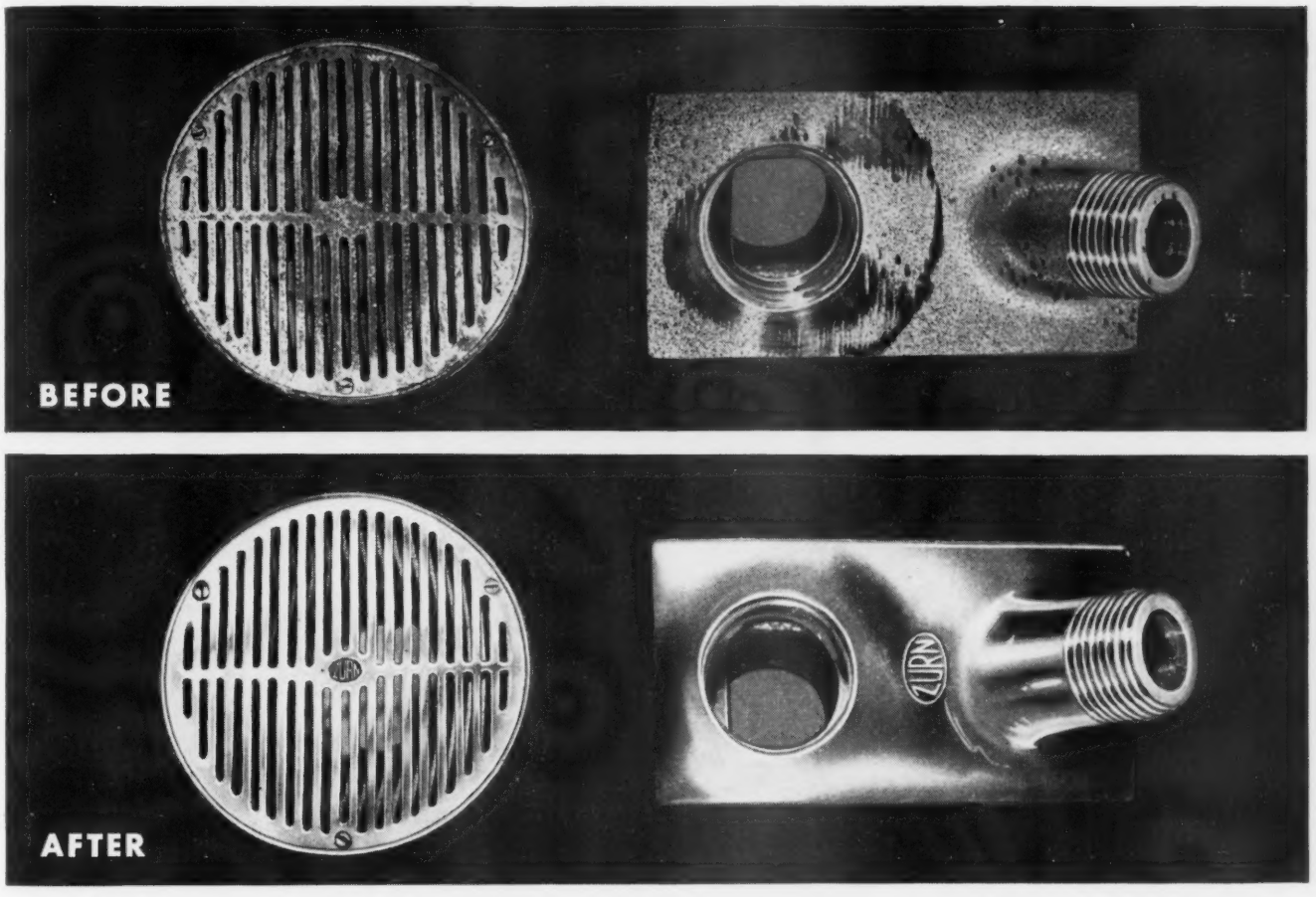
Ohio also makes
Separation Magnets,
Heavy-Duty Electric Hoists,
Nail Making Machines,
Fractional Horsepower,
Shell and Torque Motors,
Precision Threaded Parts for
Aircraft Engine Manufacturers.

THE OHIO ELECTRIC MFG. CO.
5400 Dunham Rd., Maple Heights • Cleveland, Ohio

ohio ELECTRIC

Chester Bland
President

3M METHOD... *better from start to finish*



Pennsylvania plant boosts production 50% to 100% with 3M Abrasive Belts

3M Abrasive Belts are long-lasting production tools designed to do the best grinding and finishing job at lowest cost to you.

J. A. Zurn Mfg. Co., Erie, Pa., manufacturers of engineered plumbing drainage controls, formerly used set-up wheels for grinding and finishing the two cast parts shown above — Nickel Bronze® floor drain strainers and solid bronze wall-type hydrants. By switching to the 3M Abrasive Belt Method, this company obtained the following results:

Floor Drain Strainer made of unusually tough self-polishing Nickel Bronze® alloy is rough-ground with a Grit #80 Three-M-ite Cloth Belt then polished with a Grit #180 Tri-M-ite Cloth Belt. This method increased production between 50% and 100% *and* saved the company nearly $3000 which they had formerly spent having the polishing done by an outside source.

Wall-Type Hydrant of solid bronze, is rough-ground with a Grit #80 and polished with a Grit #180 Tri-M-ite Cloth Belt then color-buffed. 3M Belts increased production over 50% and vastly improved the quality of the finished product.

3M Abrasive Belts can help you boost production, too. Your 3M Representative is an abrasives expert who can show you how the 3M Abrasive Belt Method can work best in your foundry. Call him today!

WRITE TODAY, on your letterhead, for free booklet on grinding of non-ferrous metals. Address: Minnesota Mining and Manufacturing Co., Dept. CN-96, St. Paul 6, Minnesota.

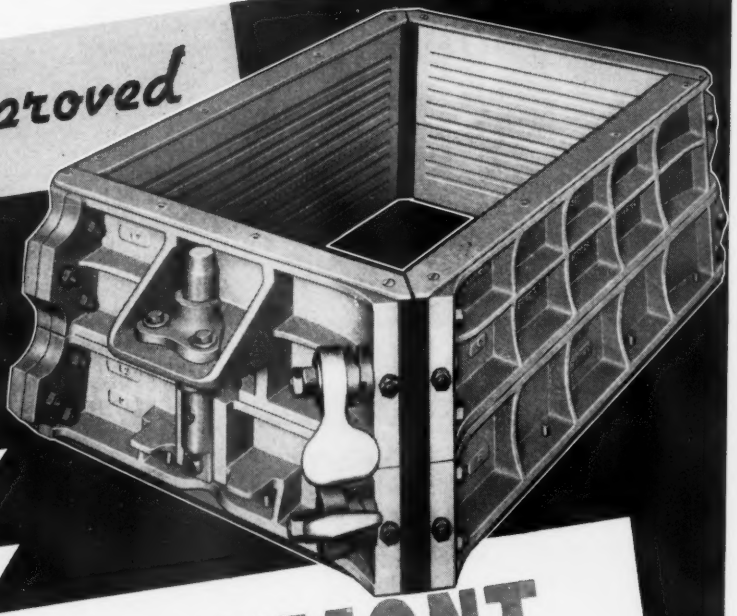
3M ABRASIVES

3M COMPANY

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

The FLASK with the NEW BUILT-IN STRENGTH

the new improved



■ New two-piece male and female stop, inserted above and below the stud bolt, result in additional corner strength. Corner gaps completely closed by long-life, easily replaceable, live rubber corner inserts which prevent sand from lodging in corners.

■ Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spread-lock really resists wear . . . assures long service.

■ Furthermore, magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.

■ The accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure most exacting work.

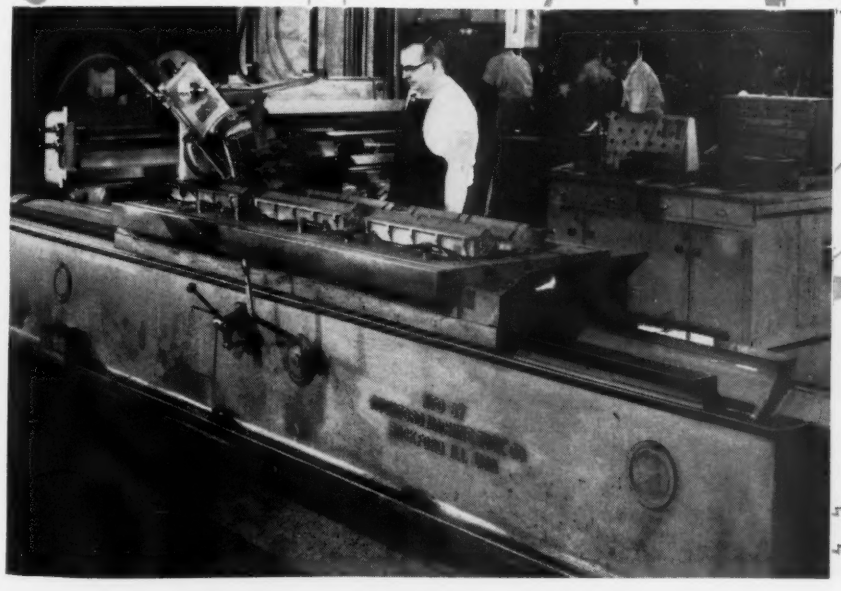
Write today for free literature and prices.

FREMONT SPREADLOCK FLASK

NO OTHER FLASK GIVES YOU ALL THESE ADVANTAGES!

The Fremont FLASK Co.
FREMONT, OHIO

LET US TELL YOU ABOUT OUR OPERATION



This Rockford Planer, like all Pyle equipment, is capable of virtually any patternmaking requirements for high-production type castings. Operated by craftsmen averaging 16 years of experience, the wide range of integrated equipment at Pyle guarantees top quality work, finished and shipped as scheduled.

Patternmaking at Pyle may not embrace all the drama of surgery . . . but pinpoint precision and devotion to detail are just as important here as in the operating room.

At Pyle your pattern is prepared by men averaging 19 years experience. From a minutely accurate wooden model, it is cast in our own foundry — designed, equipped and operated exclusively for pattern production. The aluminum or magnesium casting is then tooled on machines best suited to your needs . . . lathes, radial drills, milling machines, planers, hydraulic or automatic duplicators. Flawlessly hand-finished and meticulously inspected, it is shipped to meet your deadline.

The consistent thoroughness of our operation has won us friends among America's most respected firms. May we become friends with you?

PYLE

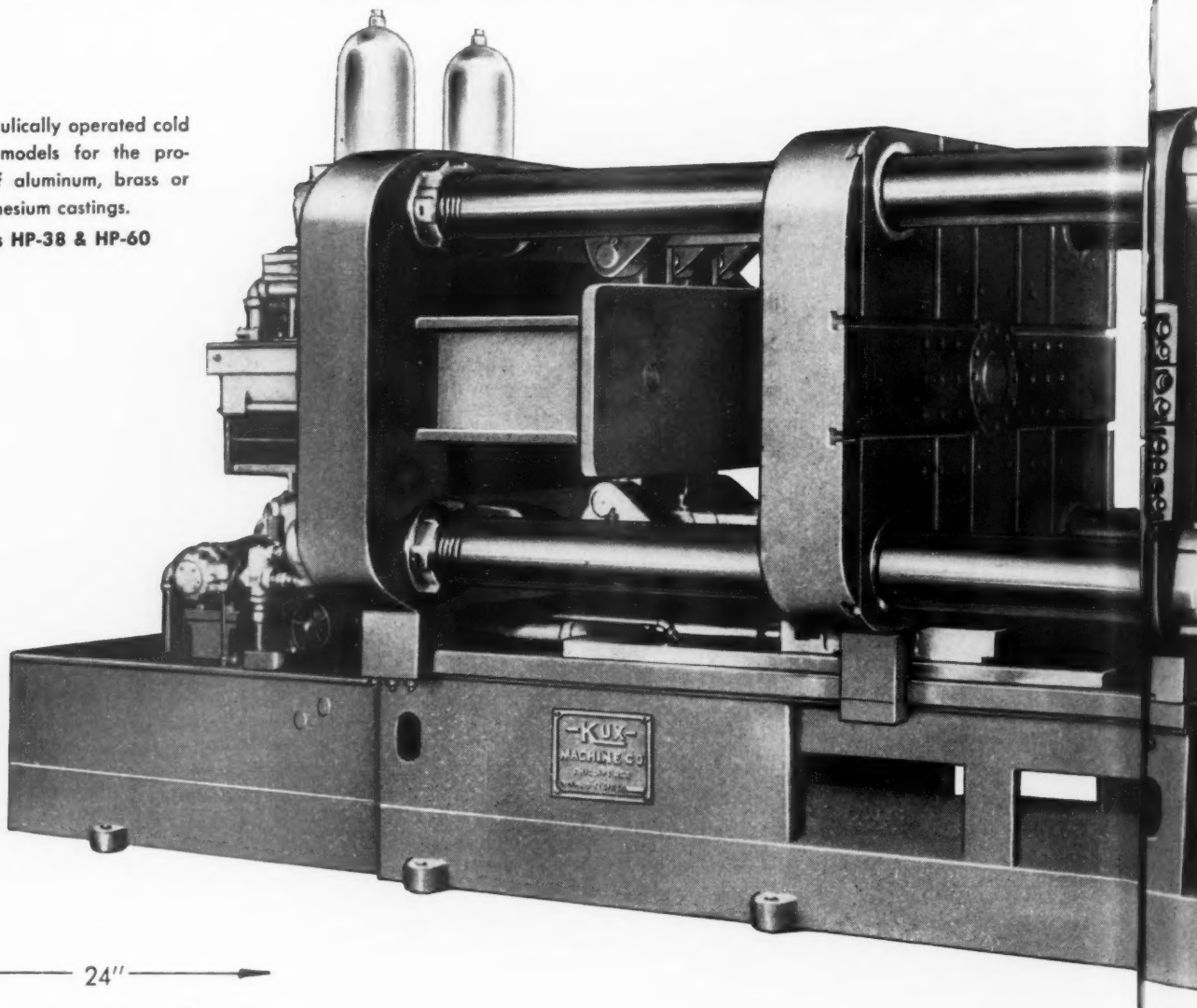
PATTERN AND MANUFACTURING COMPANY

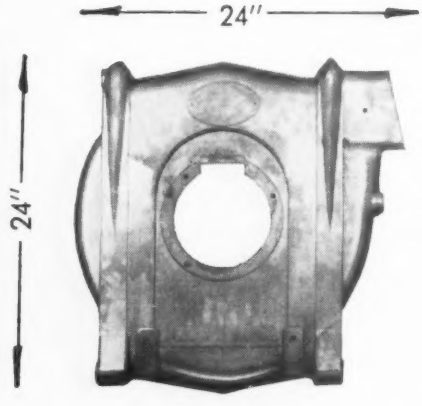
Muskegon, Michigan

Circle 630 on Inquiry Card—Page 245

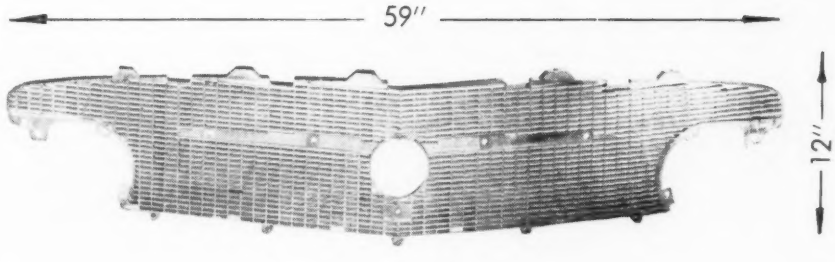
The mammoth Kux

*Kux hydraulically operated cold chamber models for the production of aluminum, brass or magnesium castings.
Models HP-38 & HP-60





Rotary lawn mower housing, a one piece aluminum die casting produced on the mammoth **Kux Model HP-38**



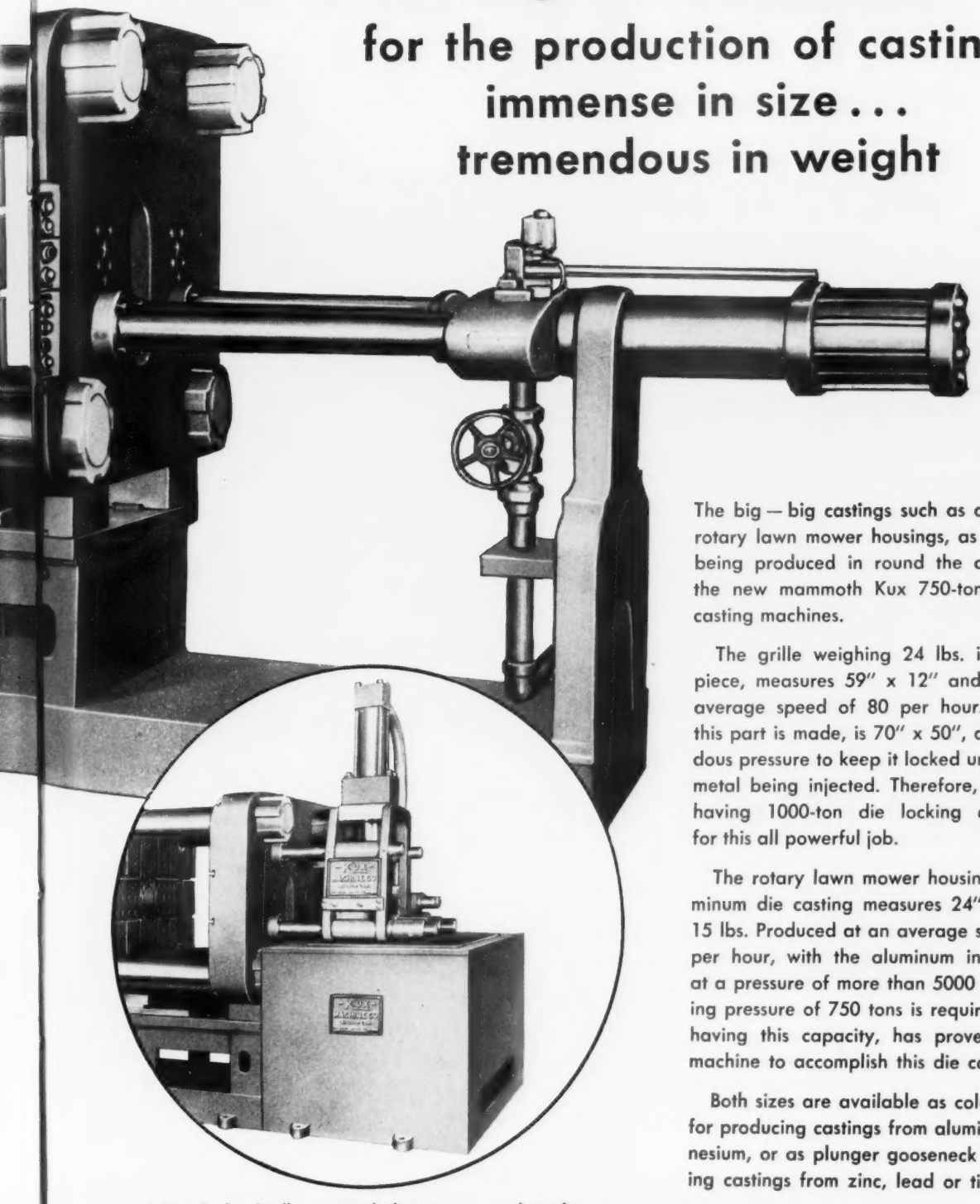
Automobile front grille cast in one piece in zinc on the mammoth **Kux Model BH-60**

ILLUSTRATED ARE ONLY TWO MODELS OF A FULL RANGE OF KUX DIE CASTING MACHINES FROM 25 TONS TO 1000 TONS.

KUX MACHINE COMPANY • 6725 North Ridge Avenue, Chicago 26

750-ton and 1000-ton die casting machines

for the production of castings immense in size . . . tremendous in weight



**Kux hydraulically operated plunger gooseneck models for the production of lead, tin or zinc castings
Models BH-38 & BH-60

The big — big castings such as automobile grilles or rotary lawn mower housings, as illustrated, are now being produced in round the clock operations, on the new mammoth Kux 750-ton and 1000-ton die casting machines.

The grille weighing 24 lbs. in zinc, cast in one piece, measures 59" x 12" and is produced at an average speed of 80 per hour. The die, in which this part is made, is 70" x 50", and requires tremendous pressure to keep it locked under the force of the metal being injected. Therefore, the BH-60 machine having 1000-ton die locking capacity is utilized for this all powerful job.

The rotary lawn mower housing, a one piece aluminum die casting measures 24" x 24" and weighs 15 lbs. Produced at an average speed of 60 castings per hour, with the aluminum injected into the die at a pressure of more than 5000 lbs. PSI, a die locking pressure of 750 tons is required. Thus the HP-38, having this capacity, has proven to be the ideal machine to accomplish this die casting job.

Both sizes are available as cold chamber models* for producing castings from aluminum, brass or magnesium, or as plunger gooseneck models** for making castings from zinc, lead or tin alloys.

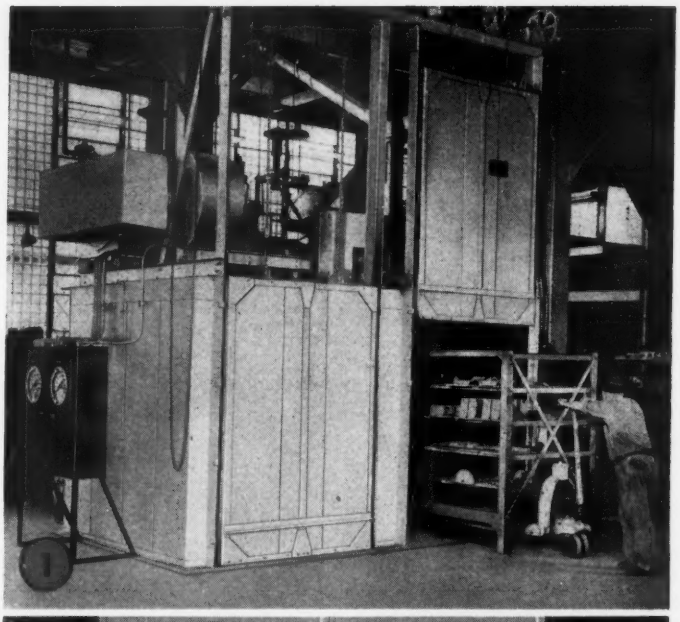
KUX MACHINE COMPANY • 6725 North Ridge Avenue, Chicago 26

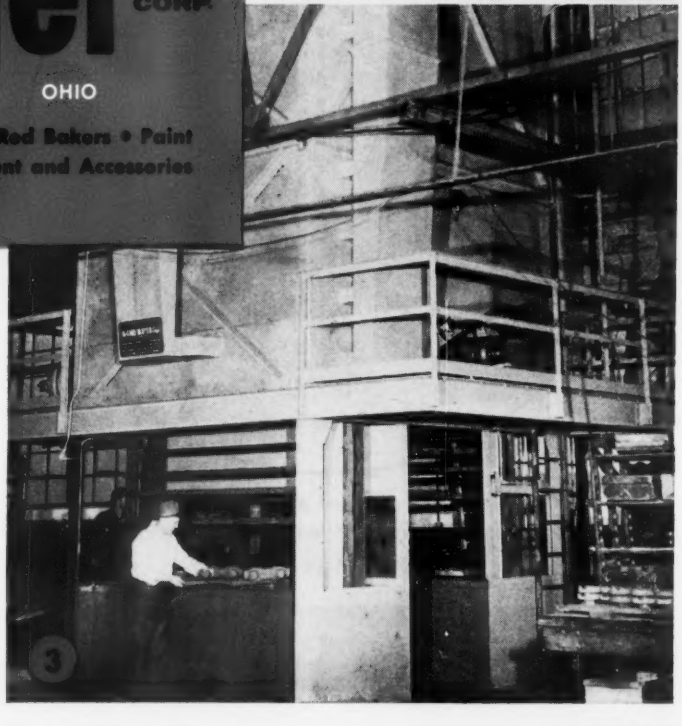
Circle 631 on Inquiry Card—Page 245

carl mayer CAN DO IT

That's right, for any baking requirement there's a Carl Mayer oven that will do the job faster and cheaper, to give you the efficiency so necessary in today's competitive markets.

The exclusive heat recirculation and slotted panel construction features cut fuel costs and heating times by as much as 50%. Uniform temperatures, assured by heat recirculation, guarantee perfect baking conditions throughout the entire oven.





THE carl mayer CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Write for Bulletin 53-CM

Hundreds of modern foundries of all sizes have found the efficiency and economy of Carl Mayer ovens pay off. Find out for yourself. Our engineers will be happy to consult with you on your particular problem.

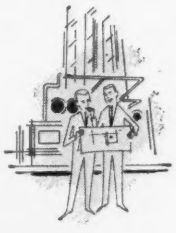
1. This rack type oven, with heat recirculation, holds temperatures within ±5° throughout the oven.
2. Downdraft heating method on this car type oven increases efficiency up to 50%.
3. This vertical oven features the special internal heat fan—increases efficiency, lowers maintenance cost.

Circle 632 on Inquiry Card—Page 245

Johns-Manville organizes to give you better insulation service

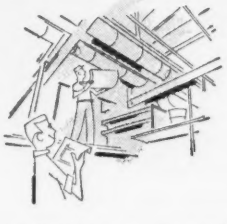
New and separate insulations division created to provide industry greatly improved Sales and Engineering service to meet modern problems

• Johns-Manville is now concentrating all industrial insulation operations within a new, fully integrated insulations division. This greater specialization makes possible the most complete insulation service available to industry. It consists of—



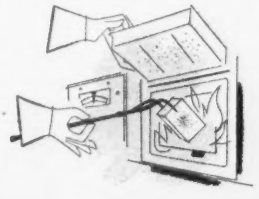
Sales Representatives . . . men on whom you can rely for your insulation recommendations. Your J-M salesman will help you select the insulating material exactly right for your job—the one that will provide maximum fuel savings, improved process control, and minimum maintenance. As co-ordinator of J-M's extensive research-engineering-manufacturing facilities, he offers you outstanding insulation training and experience.

Insulation Engineers—Backing up the J-M salesman on every job is the J-M insulation engineer. He is primarily concerned with solving insulation problems. He recommends the economic thickness of insulation, as well as the proper finishes, weatherproofing and securement. His highly specialized knowledge makes possible an intelligent recognition and handling of your individual insulation requirements.



Insulation Contract Units . . . Fully aware that no insulation is better than the man who applies it, the J-M Insulation Contractor makes care and skill in the scientific application of Johns-Manville insulations his stock in trade. He maintains a complete crew of estimators and mechanics trained in J-M application techniques. He is ready to give you fast, efficient service on any insulation job—large or small. Proud of his reputation for integrity in his own community, the J-M Insulation Contractor merits your complete confidence.

Complete Range of Products—In this day of exacting temperature control, the need for specific insulations for specific services is greater than ever before. Recognizing this, Johns-Manville manufactures insulations for every industrial requirement. Produced from the finest grades of asbestos, magnesium carbonate, diatomaceous silica, refractory clays and ceramic fibers, they are designed to afford maximum insulating effectiveness and durability at operating temperatures ranging from minus 300F to plus 3000F.



Extensive Research Facilities—At Manville, New Jersey, Johns-Manville maintains the world's most completely equipped insulation laboratory. Here insulation scientists are engaged in a continuous program of developing new and better insulating materials. In addition, their technical knowledge is always available to J-M customers whose insulation problems require special study.

Experienced Management—At headquarters as well as in the field, management of the new insulations division consists of men who, in line with J-M's promotion-from-within policy, are insulation veterans. With a realistic grasp of customers' needs, they are alert to new and better ways to serve you . . . now, and in the future.

On Your Next Insulation Job—Whether your next insulation job is big or little, simple or complex, let Johns-Manville handle it for you. Just call your nearest J-M sales office, or write direct to Johns-Manville, Box 14, New York 16, New York. In Canada, Port Credit, Ontario. *Chances are, you'll be glad you did!*

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville *first-in* INSULATION

MATERIALS · ENGINEERING · APPLICATION

Circle 633 on Inquiry Card—Page 245

Gardner-Denver... Serving the World's Basic Industries

Keep production on the up and up

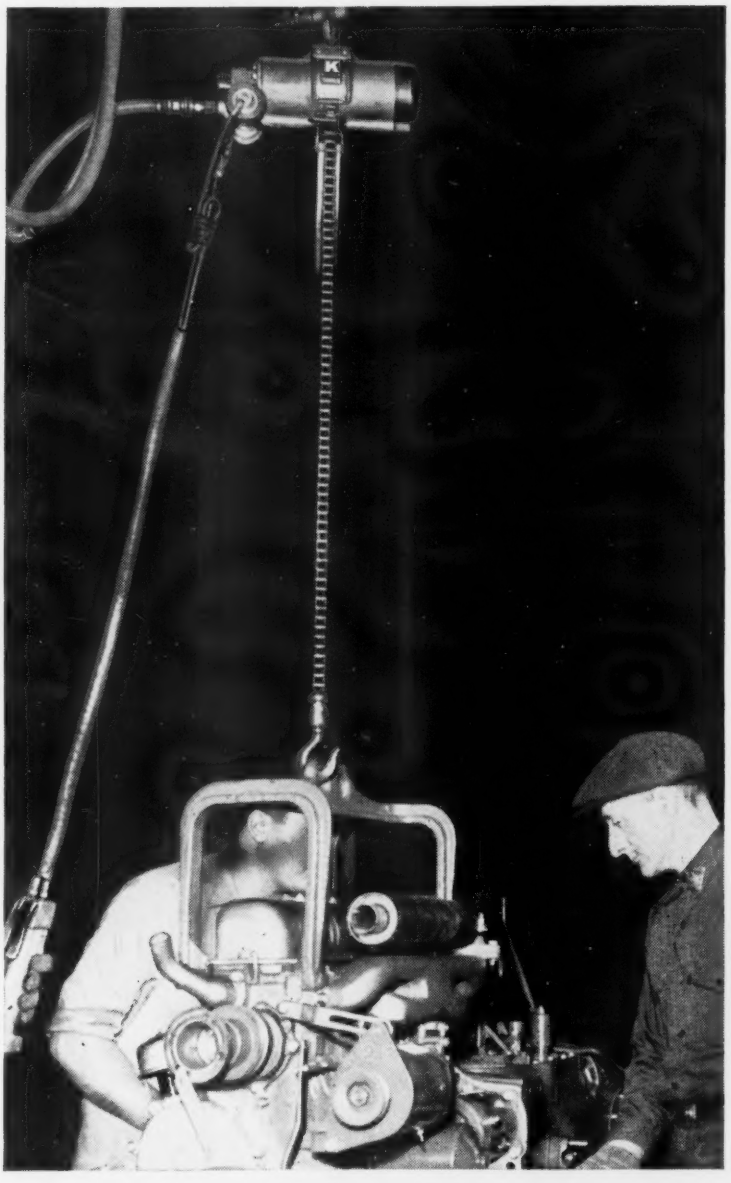
with powerful, lightweight Keller Tool air hoists

Here's the hoist you can start and stop all day long—without any danger of a burned-out motor to halt production. It's powered by a Keller Tool axial piston air motor that just won't burn out.

Keller Tool air hoists offer other advantages as well, including easily controlled speed—fast for the high lift—creep for accurate load spotting.

When you need a lift in a dusty room or in a corrosive atmosphere, a Keller hoist will handle the job without unusual maintenance. The enclosed air motor is made for such locations.

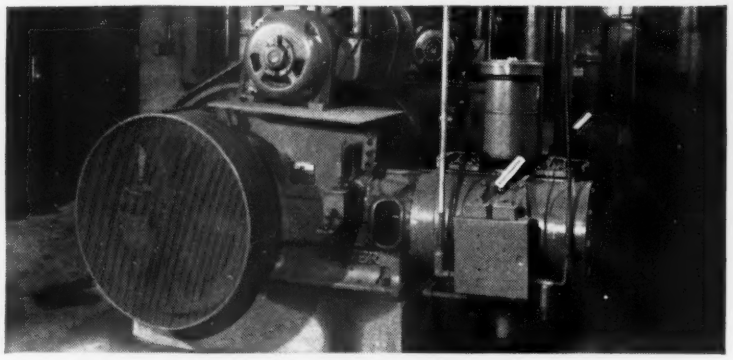
Every Keller Tool air hoist is light in weight in relation to its lifting capacity. Simplifies moving and hanging. All sizes furnished with roller chain; some sizes also available with link chain. Check the capacity you need in the table below:



Model	Capacity	Speed	Weight
86-1V3	300 lb.	80 f.p.m.	28 lb.
86-1V5A	500 lb.	35 f.p.m.	28 lb.
86-1V10*	1000 lb.	19 f.p.m.	28 lb.
86-2V10	1000 lb.	35 f.p.m.	78 lb.
86-2V20*	2000 lb.	19 f.p.m.	78 lb.

*Available with link or roller chain

Send today for Bulletin 86.



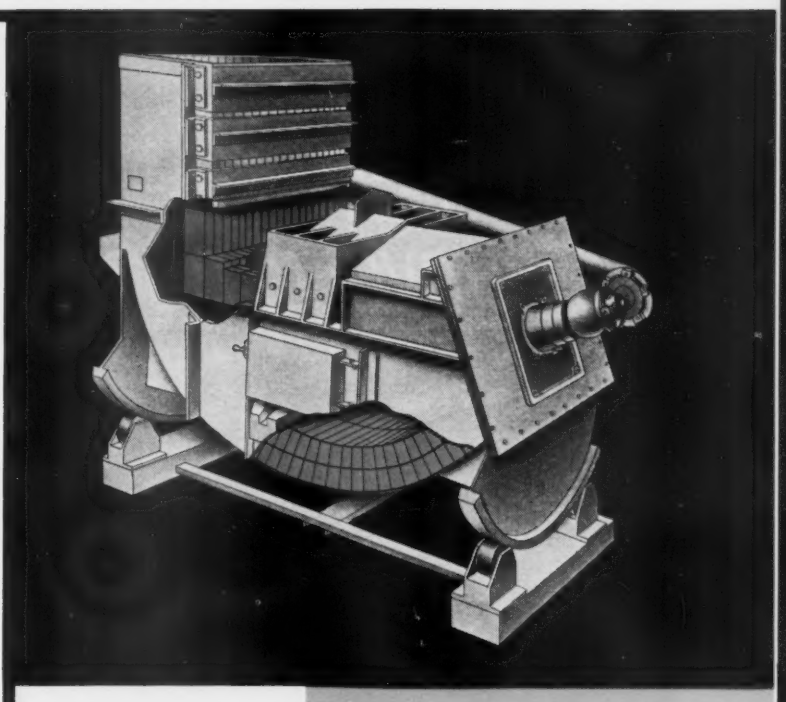
A popular unit in the compressor room: the Gardner-Denver RX. Capacities from 90 to 1300 cfm. Described in Bulletin HAC-40.

GARDNER - DENVER

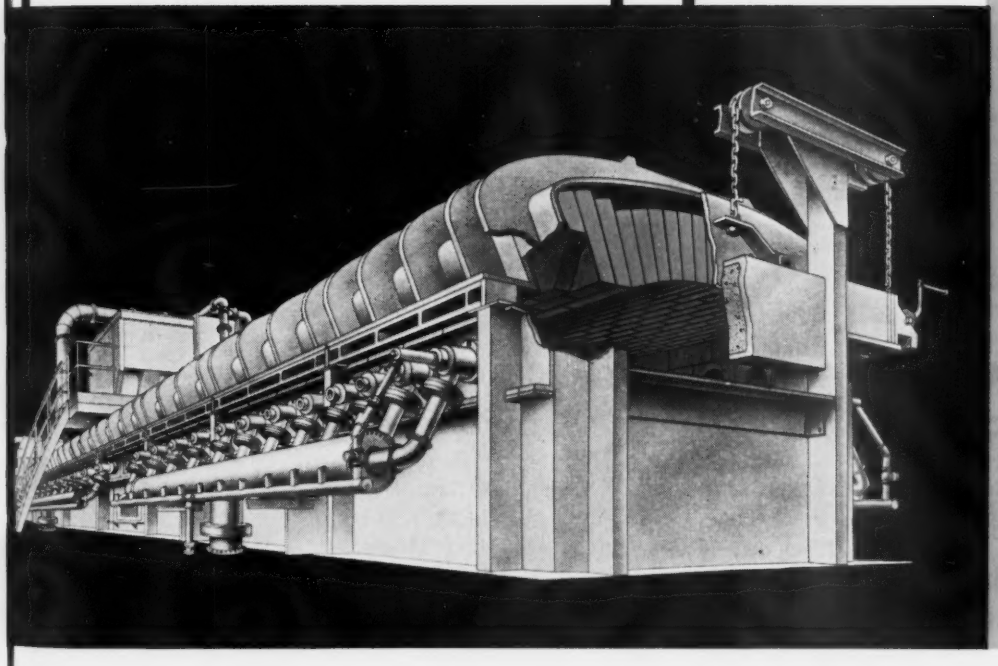
KELLER TOOL division, Grand Haven, Michigan

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Why B&W Allmul Firebrick withstand punishing service in furnaces like these



Direct-fired reverberatory furnace for melting brass, aluminum, and iron. For longer refractory life, B&W Allmul Firebrick are used to line the bath and arch.



In this type of furnace for continuous high speed heating of strip for welding into pipe, temperatures in excess of 3000 F are common and the atmosphere is contaminated with iron oxide. Because of their resistance to spalling and metal penetration, B&W Allmul Firebrick have set new standards for refractory life in bungs, burner blocks and recuperators.

B&W Allmul Firebrick stand up under extremely high temperatures at continued high rates of operation because they are produced from electrically melted mullite grain by a highly efficient process. These top-quality brick have high hot-load strength, high resistance to spalling, good volume stability and a melting point of 3335 F.

They are practical from a cost standpoint for a wide range of applications in the ferrous and non-ferrous metal industries. Illustrated on this page are a butt-weld furnace as well as a direct-fired reverberatory furnace. Other services are direct and indirect-arc electric furnaces, air furnaces, furnace hearths subject to iron oxide scale attack, crucible melting units and furnaces melting many non-ferrous metals and alloys.

Your B&W representative can show you how B&W Allmul can lower your refractory costs in many heavy-duty services. Consult him or write for Bulletin R-34A, giving data on B&W Firebrick for exacting services.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

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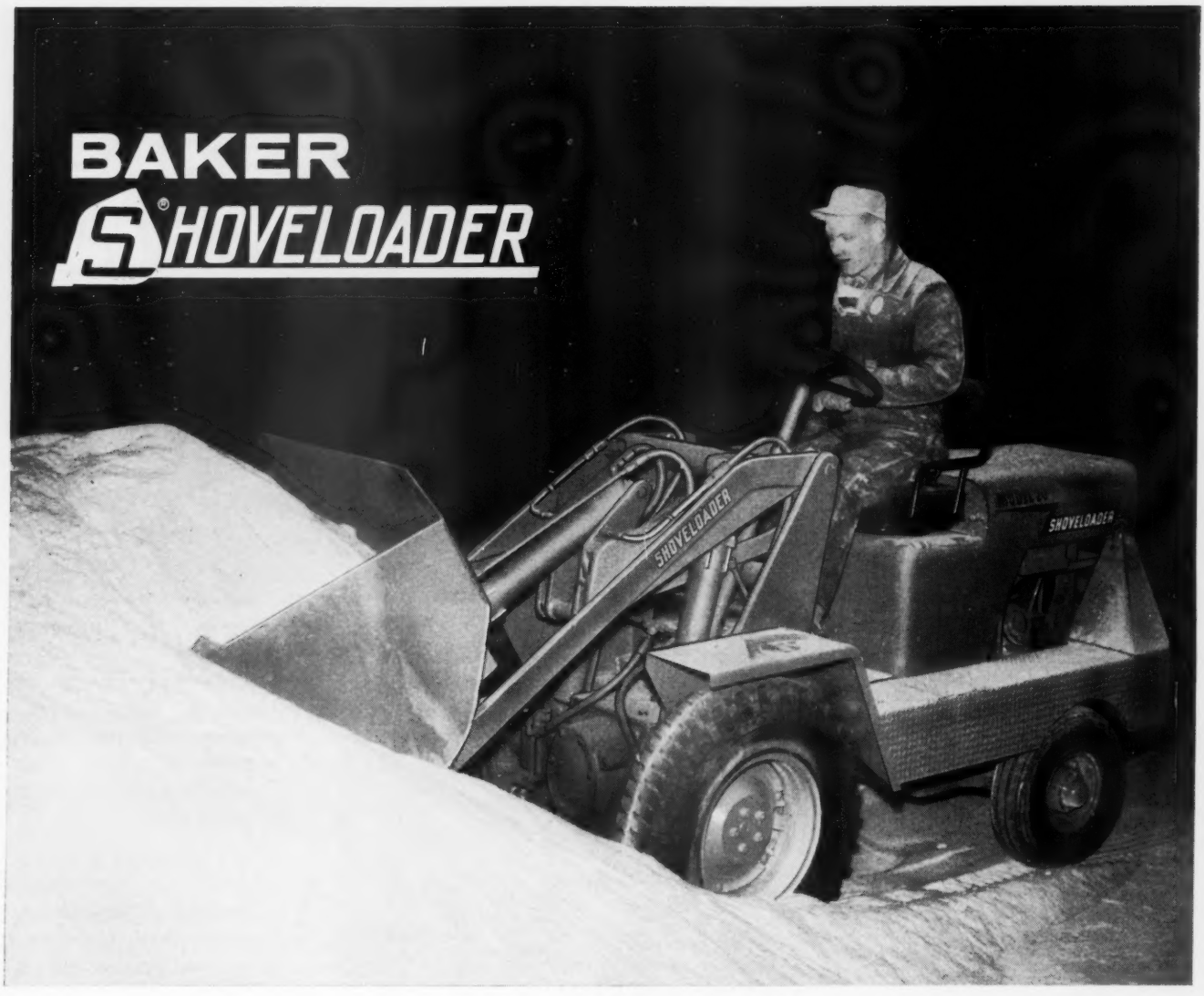


...mechanizes your bulk handling for less per day than the cost of a laborer with a hand shovel

Baker Shoveloader costs around $400 less than comparable machines—enables you to mechanize bulk material handling for about $10 per day—less than the pay of a laborer with a hand shovel.

Designed for continuous heavy work, Shoveloader takes a 12 cubic foot bite weighing up to 1500 pounds. Four forward speeds with top speed of 14 mph make this a fast machine and insure better operation on ramps and rough ground.

And don't forget safety when you compare. The operator is behind the lift arms and has a full 360° view at all times. He can see both bottom and end plates of the bucket when loading. Other exclusive features include "all-in-one" power train (engine, transmission, drive axle, wheels), longest forward reach, and the famous Baker hydraulic pump and cylinders for long-life dependability.

Shoveloader is versatile, too. Use it for other plant operations with any of the following accessories available at low extra cost: lift-forks, solid tires, narrow bucket, crane hook, and catalytic muffler. Write us or telephone your Baker representative for complete information.

Baker
handling equipment

THE BAKER-RAULANG COMPANY

1223 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

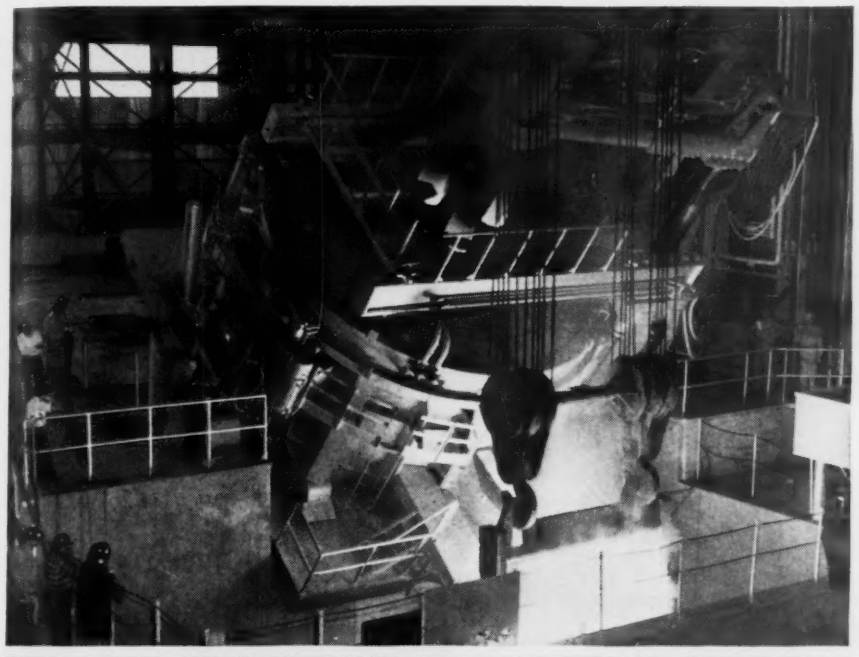
6SB1

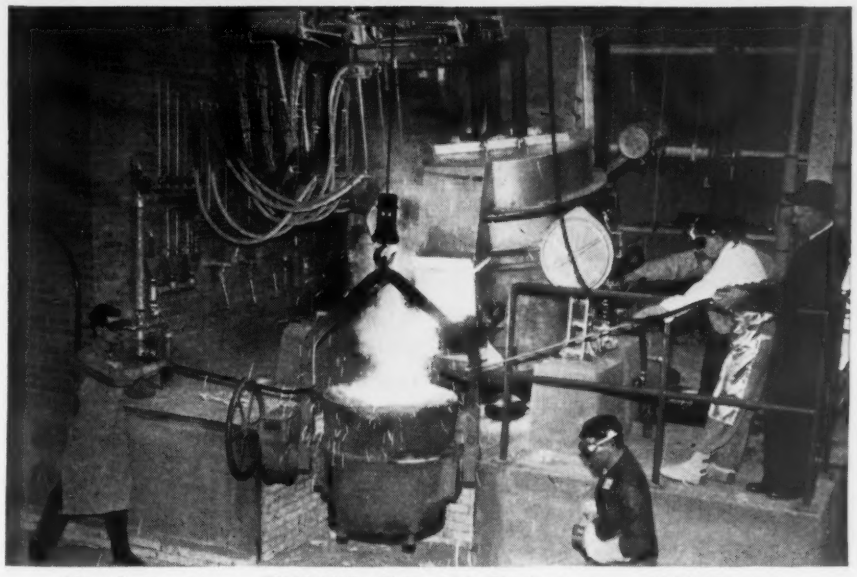
Circle 636 on Inquiry Card—Page 245

evolutionary

is the word that best describes

LECTROMELT* FURNACES





● Lectromelt's revolutionary announcements were made years ago, when these developments were first introduced by Lectromelt to the metallurgical industry:

Top charging for smooth, fast turnaround in electric furnace operation. There's less downtime between heats and less heat loss. Linings and the electrodes last longer.

Power input boosted tremendously, doubling the day's output. Lectromelt construction was heavied up, larger transformers and leads provided, more efficient cooling added.

Micro-accurate electrode control was combined with counterbalanced arms, greatly increasing the exactness to which analyses could be held. Supervisory labor was thus made much less burdensome.

Why label as revolutionary the things that have long been standard on Lectromelt Furnaces? The same bold thinking—evolutionary thinking—has been constantly applied to Lectromelt Furnaces and Equipment to maintain the leadership established many years ago.

Catalog 9-B describes Lectromelt Furnaces. For a copy, write Lectromelt Furnace Company, 314 32nd Street, Pittsburgh 30, Pennsylvania (a McGraw Electric Company Division).

On research and on production, Lectromelt Furnaces provide the precision of control so necessary to the steelmaker.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagoya

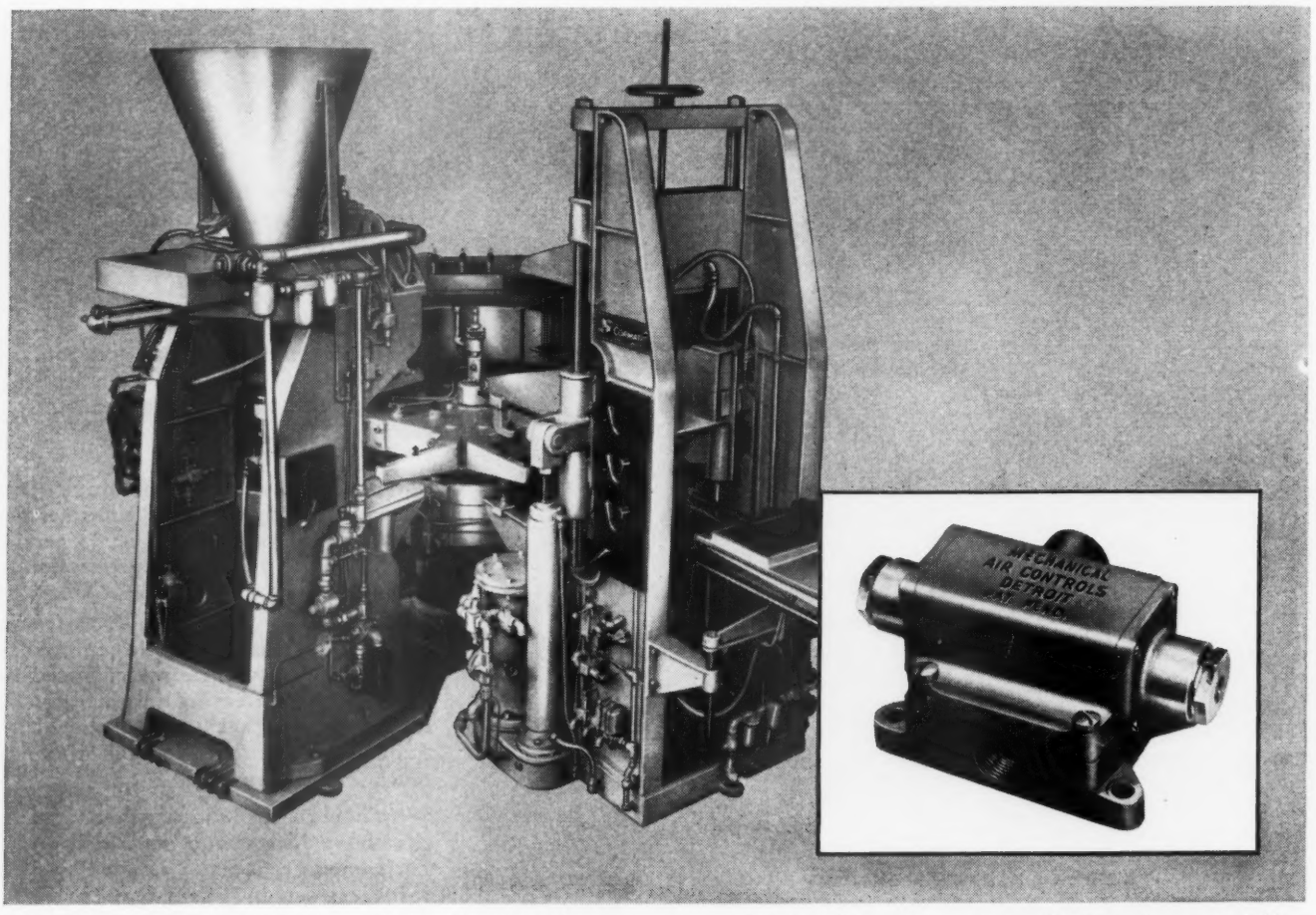
*REG. T. M. U. S. PAT. OFF

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

Circle 637 on Inquiry Card—Page 245

1200 SHELL CORES AN HOUR... and AIR DOES THE WORK



AUTOMATION COMES TO FOUNDRIES with Beardsley & Piper's new "Cormatic". Its intricate *all-air* control circuit features 33 MAC valves . . . provides the split-second operation needed to produce up to 1200 close-tolerance shell cores an hour using multiple core boxes.

MAC valves are showing up everywhere . . . and showing up well.

A glance at the "Cormatic" above illustrates the point. Here, on the latest in foundry equipment, 33 MAC air valves are used. You may be sure they'll endure the test of dust, dirt and moisture . . . perform with precision and reliability for millions of cycles.

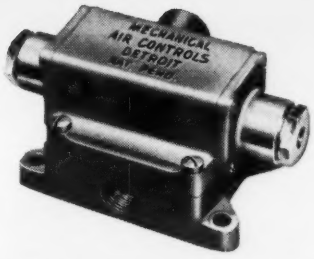
Why not check MAC for all *your* original equipment and replacement needs? You'll find MAC valves light and compact . . . and with fewer parts to wear or cause trouble. It's one of the most complete lines in the industry, too—a wide range of sizes in pilot, pilot-operated and solenoid models.

Contact a MAC field representative, listed at the right, for an assist on any air control application. Or, for free literature, write to:

MECHANICAL AIR CONTROLS, INC.

Office and Factory—10030 Capital, Oak Park, Detroit 37, Michigan

MAC



PHONE YOUR NEARBY "MAC" REPRESENTATIVE FOR DATA AND DELIVERY

CALIFORNIA
OAKLAND 8—The Rucker Co., 4700 San Pablo Ave., OLympic 3-5221
SOUTH GATE—The Rucker Co., 4956 Firestone Blvd., KImball 8271

COLORADO (and NEW MEXICO, UTAH, WYOMING)
DENVER 16—Blair Engineering Co., 4100 Grape St., FLorida 5-7142

ILLINOIS
CHICAGO 43—Mike C. Modrich Co., 10918 South Western Ave., HIlltop 5-3640

INDIANA
FORT WAYNE 3—Neff Engineering Co., P.O. Box 2001, Station A, 2339 Crescent Ave., EAstbrook 7391
INDIANAPOLIS 20—Neff Engineering Co., P.O. Box 7361, 42nd St. Station, BRoadway 2330
SOUTH BEND—Dick Futter, 103 South Varsity Dr., CEntral 2-3800

MASSACHUSETTS (and New England)
BOSTON 34—Electrical Apparatus Co., Inc., 1200 Soldiers Field Rd., STadium 2-7440

MICHIGAN
BAY CITY—Fred Kober, 506 Chilson St., 2-2629
FLINT—Kober Sales Engineering Co., 514 Beach St., CEdar 8-5123
Western Michigan—Everett Adams, 17212 Sharon Road, Chesaning, Michigan; Chesaning 383-J-1

MINNESOTA
MINNEAPOLIS 4—Air Engineering & Supply Co., 2445 Nicollet Ave., FEderal 9-5579
ST. PAUL 14—W. H. Schulz Co., 2438 Franklin Ave., MIdway 4-2791

MISSOURI
ST. LOUIS COUNTY—Oscar E. Jost Co., P. O. Box 6, St. Ann, HArrison 8-4488

NEW JERSEY (Northern)
CRANFORD—The Roden Company, P. O. Box 305. CRanford 6-7330

NEW YORK
BUFFALO 21—C. H. Tepas Co., 200 Washington Hwy., CIrcle 3210

OHIO
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DAYTON—The R. W. Nichols Co., 407 Realty Bldg., Michigan 4724
OLMSTED FALLS—The R. W. Nichols Co., P. O. Box 6, BErea 4-1379
TOLEDO—R. W. Nichols Co., 510 Manhattan Building, Toledo 4, CHerry 1-1447

OREGON
PORTLAND—The Rucker Co., 911 N. W. Hoyt St., BEacon 0205

PENNSYLVANIA
PHILADELPHIA—Grand Air-Hydro Co., P.O. Box 141. Glenside, TUrner 7-4296
PITTSBURGH 22—The R. W. Nichols Co., 101 Investment Bldg., ATlantic 1-6050

TEXAS
DALLAS 19—Womack Machine Supply Co., Shea Rd. at 7150 Harry Hines, FLeetwood 7-3871

WASHINGTON
SEATTLE—The Rucker Co., 1000 4th Ave., South, MAin 2783

WISCONSIN
MILWAUKEE 17—Neff Engineering Co., 5856 N. Pt. Washington Rd., EDgewood 2-1579

CANADA
ONTARIO, HAMILTON—Higginson Engineering Sales. P.O. Box 23 (275 James, North), JAckson 9-2262

MECHANICAL AIR CONTROLS, INC.
DETROIT 37, MICHIGAN

MAC

Circle 638 on Inquiry Card—Page 245

Readers' Comment

Foundry Training Needs

TO THE EDITORS:

The article in the July issue of FOUNDRY entitled "Foundry Training Needs" is one of the finest pieces of publicity on training which we have seen in a long time.

We have been enthusiastic about the outstanding work of the special committee studying training needs in the foundry industry, of which you are a member. The very existence of this committee is at least partly due to the emphasis which you have placed on the subject over a long period. We are therefore pleased at this latest demonstration of your interest.

The results of the committee's efforts in determining training needs, and in indicating what needs to be done to meet them will be important to the foundry industry, one of the most critical, as you well know, to the national economy and national defense. But, important as these results may be to this one industry, it may have even greater significance.

We anticipate that the approach used by the special committee will be used by other industries which need to examine the problem of their training needs, and to attempt to find practical solutions for them.

Please accept our congratulations and our appreciation for this latest evidence of your efforts in behalf of adequate training in the foundry industry.

WILLIAM F. PATTERSON
Director

Bureau of Apprenticeship
U. S. Department of Labor
Washington 25

* * *

Hardness Proves Surprising

TO THE EDITORS:

Information recently obtained suggests that the brinell hardness of gray iron is affected significantly at temperatures as low as 210° F.

Furthermore, the effect of temperature is in the opposite direction to that which one would expect from a low-temperature aging effect. The iron appears to be about 10 brinell points softer at 210 to 250° F than it is at room temperature. Also, the effect is reversible—the iron hardens again as it cools.

I was introduced to this effect by a foundryman who had observed it and told me about it. Frankly, I thought that his methods of measurement might have been in error. However, checks in our own laboratory verified his statements. I talked to Dan Krause of the Gray Iron Research Institute about the effect. He was also skeptical until he made similar tests and found the same results. Some of our results were as follows:

	Bhn		
	Lownie	Krause Iron 1	Krause Iron 2
Hardness at 70°F before heating	146	159	210
Hardness at higher temp.	137(210°F) 137(190°F) 140(170°F)	149(250°F)	202(250°F)
Hardness after heating and cooling to 70°F	146	162	213

Notice that the same effect was obtained on three different irons by two different laboratories. I used an oil bath for heating, Krause used an oven. We both used samples large enough to retain temperature during the measurement. We both used calibrated brinell machines with a 3000-kg load and a 10-mm ball. We both made the hot impressions at temperature and read the diameters at room temperature. On our soft iron, the impressions made at 210° F are visibly larger than those made at room temperature.

This effect has caused at least one foundryman some trouble when he was working to close bhn specifications and his inspectors were testing hot castings.

It is surprising to us that such a small increase in temperature can have such an effect on hardness. This effect is not (I believe) generally known. We wonder whether anyone else has experienced it.

H. W. LOWNIE JR.

Battelle Memorial Institute
Columbus 1, *O.*

* * *

Identifies the Illustration

TO THE EDITORS:

This is in reference to the picture on page 308 of the June 1956 issue of FOUNDRY showing a control board with a question for a title.

The correct title of what this picture is and where it was taken is "the control panel for the sand reclamation unit at the Wright Aeronautical Corp., Plant No. 3 at Fairlawn, N. J." This unit was a completely self-contained interlocked unit which automatically calcined 350 tons of core sand per 24 hours.

JOHN P. IRWIN
Foundry Engineer

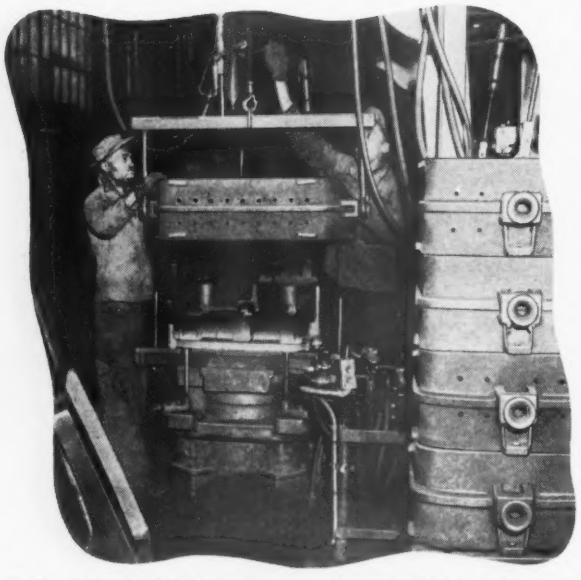
Lester B. Knight & Associates
375 *Fifth Avenue*
New York 16

THAT'S WHAT Sterling FOUNDRY FLASKS ARE MADE OF...

ROLLED STEEL

Not Pressed Steel

...and that's why they stand the gaff of tough foundry use



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WHEREVER METALS ARE CAST . . . FOUNDRY

September 1956

Watch Your Prices !

The steel strike is over, steel labor costs have gone up, and increases in the prices of steel have been announced by producers. Buyers of castings are expressing interest in the effect of the settlement on the prices of castings.

Effect of this industrial dislocation on production costs of castings will vary throughout the foundry industry. A sizable number of foundries, including many producers of steel and malleable castings, are tied in quite closely with the same labor unions as basic steel. Early settlement of wage negotiations in those foundries will necessitate price increases for castings.

In other foundries, many different unions have wage contracts. These contracts terminate at various times, so that price increases may be governed, to some extent, by the signing of individual contract agreements.

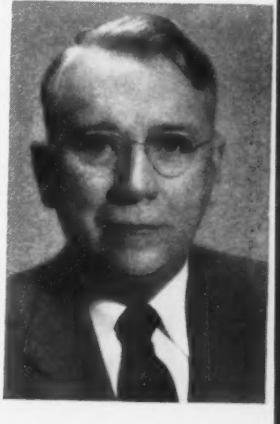
Other factors will have an important bearing on the timing of increases in the prices of castings. Scrap prices are moving up rapidly. Increases in the cost of pig iron, coke and refractories already have been announced. Inflationary influences resulting from increases in steel prices and from other factors will result in higher prices for both machines and materials used by foundries. All of these trends must be watched carefully by foundrymen.

In arriving at pricing decisions, foundrymen should remember that labor represents a much higher ratio of total cost in producing castings than in producing basic steel. This means that a foundry granting a wage settlement equivalent to that provided in the steel industry package will find itself with costs which necessitate more than a 6.25 per cent price adjustment (the price increase of several steel producers) to compensate for the increased cost.

Foundrymen should make these variations in the price picture clear to their customers. They should point out the close parallel and the essential differences between their individual situations and that of the basic steel industry.

Most of all, they should explain the difference in the effect of wage increases on costs in the foundry industry.

Relatively uniform and simultaneous price adjustments are not feasible in the foundry industry. But the trend is up, and now or in the near future individual foundries will have to increase the selling price of castings.



Frank G. Steinbach

Editor

Aluminum Impellers Cast with Plaster Cores

By ANTHONY POLIZZOTO
Supervisor, Aluminum Foundry
AiResearch Mfg. Co. Division
Garrett Corp.
Los Angeles

Acceptable cast aluminum impellers for aircraft must withstand a speed of 52,000 rpm with a 20-per-cent overspeed. Plaster cores are the key to adequate internal smoothness

AS MODERN aircraft attain higher and higher speeds, the search continues for new processes, materials and methods to be used in their construction. Among the pioneers in this work is the Garrett Corp.'s AiResearch Mfg. Co. division, a leading manufacturer of aircraft component systems and accessories.

Among the major problems encountered by us in the constant battle for improvement was the requirement for a high-speed cast aluminum impeller.

These impellers are used in many types of aircraft equipment such as cooling turbines, gas turbine compressors, cabin air compressors, etc.

Although AiResearch previously had never ventured into the making of castings, it was found possible, after much experimentation, to produce highest quality castings efficiently in our own foundry.

To produce an acceptable cast aluminum impeller, one that will withstand a speed of 52,000 rpm with a 20 per cent overspeed, requires a casting that is metallurgically correct, with flaws held to an absolute minimum. These requirements resulted in the use of the centrifugal process to help attain the necessary maximum physical properties.

Sizes of impellers vary with their usage or application. Some are 6 to 9 in. in diameter, with a blade thickness of 0.065-in. at the center and a taper of 0.040-in. at both ends. The shroud dimension of 0.070-in. is a critical dimension. The bottom shroud is not designed to allow machining, to insure that the physical properties attained from the chilled cast surface tolerances of ± 0.002-in. be met.

Smooth Surface Required—Due to the design requirements of these impellers, our foundry problems increased as it was necessary to produce impellers that were also internally smooth. To obtain this smoothness required the use of plaster cores.

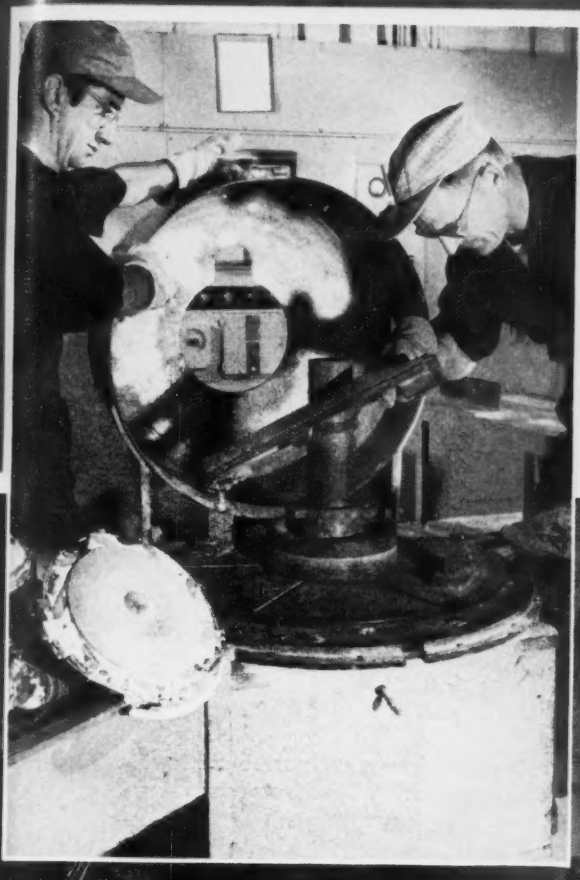
Through many test runs we finally developed a plaster mix that gave us the smoothness we wanted. This mix had to be able to withstand the high preheat temperatures and centrifugal force without breaking or distorting the cores.

In our original method of making coreboxes, we used a hard plaster or tool stone. We now have found that a casting type plastic and a parting agent produce very fine cores. The ingredients are mixed by an accepted mixing practice.

Many impellers made by our foundry have from 9 to 18 blades. Therefore, the cores are individually made and are prepared with wires projecting from both core prints around which the plaster is poured. After the parting lines are cleaned, they are indexed into a precision assembly fixture and a spatulated mixture of plaster is poured. Both upper and lower core prints are cemented in this fashion. Naturally utmost care is exercised in accurately assembling the cores before cementing.

After the core assemblies have been made and set, they are placed in a circulating air drying oven and cured at 400°F. When removed from the oven, these assemblies are ready to be poured.

After a short preheat they are placed in heated



Left—Foundry workers are clamping mold to centrifugal table before pouring the metal

Below—Man in foreground is pouring metal into pouring basin, which also acts as a riser when filled. Second man, at control panel, waits to start centrifugal machine

Men in background are removing plaster cores from plastic coreboxes. In the foreground, another man is cleaning parting lines from cores

cope and drag molds with a split metal sprue having a plaster liner. The molds used are machined from Meehanite or stainless steel castings. It is mandatory that a suitable permanent mold coating be used. Molds are then preheated in an oven at 700°F.

Further preheating of molds is unnecessary, providing pouring is done at ten-minute intervals, as the hot metal keeps the molds at desired temperature for continual pouring.

Pour into Sprue—The heated mold is closed and clamped to the centrifugal machine, and a coated steel or carbon plug is placed in the bottom of the sprue, which forms a pouring basin. Metal is then poured into the sprue.

The operator starts the machine revolving, and the plug is pulled at 75 rpm. Then the machine is accelerated to 500 rpm. During spinning, additional metal, which also helps act as a riser, is poured to fill the sprue.

After the casting and sprue have solidified and cooled to below the hot short range, the sprue casing is first removed and the sprue is cut off with a pneumatic chisel. The mold is then opened and the casting is removed. Flash is cut off by a band saw.

The plaster cores are removed by a hydraulic jet device made especially for that purpose. This jet device has 180-lb pressure and functions while the impeller is turning at 25 rpm in a sealed cabinet. The water jets wash out the plaster cores completely. Performance of this operation requires three minutes.

Inspection Methods—At this point each casting is visually inspected for obvious defects such as cold shuts. Our rate of rejection at this stage is approximately 3 per cent. If the unit is satisfactory, a ½-in. hole is drilled through the hub to help heat treat the casting properly.

This drilling is necessary because our impellers have a heavy hub. We are able to achieve better properties if water is allowed to pass through the hole when quenched. The impeller is then solution heat-treated after enough time has elapsed for cooling purposes, and each casting is tested for brinell hardness. Using a 500 kg load with a 10-mm ball, the castings must meet a reading of 90 minimum.

When the heat treatment is completed, the impeller is sent to our radiographic department where three x-ray photos are taken. Impellers are classified as A-1 castings, so the slightest visible flaw will be cause for rejection. The rejection rate here is approximately 1.5 per cent.

Another inspection is made with the fluorescent penetrant method, and here the rate of rejection is approximately 0.5 per cent.

The impeller is now ready for machining to the specifications of the blueprint. After machining, the impeller is balanced. If found acceptable it is ready for the whirl pit, where it is placed in a wood-lined unit to test for growth and fatigue.

Individual plaster cores are indexed in a precision fixture. Worker forms a complete unit by cementing both coreprints with additional plaster, which is poured around them

It is apparent why the unit is sealed in the pit when the impeller is traveling at a speed of 62,400 rpm.

Some of these impellers have even been run at speeds up to 72,000 rpm without deteriorating. After being removed from the whirl pit, they are inspected for growth. Because of good operation and constant inspection, our rate of rejections on this product is quite low.

Metal Control Important—Metal control appears to play a highly important part in the successful production of these impellers. Virgin aluminum alloy 356 is used exclusively. The metal is modified by sprinkling a 2 to 3-oz mixture of two parts by weight of technical grade sodium fluoride (NaF) with one part by weight of U.S.P. granular sodium chloride (NaCL).

This modification is accomplished as soon as the final amount of metal is in the pot and only a small amount of the ingot is protruding above the liquid level.

We use an iron content maximum of 0.15, and a magnesium content minimum of 0.35 to a maximum of 0.40. To attain this composition we make an ingot analysis, and when the magnesium content is too low, then additional magnesium is added in a quantity which is in accordance with a prepared chart.

Test samples of metal content are taken every two hours and the metallurgical department makes a complete analysis of the content. If the metal is not up to specification, the parts already cast are scrapped and the scrap metal pigged. The furnace is recharged with virgin metal and new coupons are taken again.

The cast iron metal pots used for melting are cleaned and painted after every 8-hour shift. The metal is thoroughly degassed with dry nitrogen and is not poured until a satisfactory sample coupon has been taken. Samples are taken by means of a vacuum machine especially designed for the purpose.

Our centrifugal machines consist essentially of variable speed DC-motor-driven horizontal tables. The table is fitted with a mold centering plug and a clamp for securing the mold in place. A hinged lid, which has a hole through it for pouring metal, is provided. The machines are equipped with remote control for accelerating, decelerating, braking and an indicating tachometer.

The centrifugal process described is one of many in use today. To say it is the best or that it could not be improved would be a misstatement.

AiResearch feels that, despite ten years of development and use of the centrifugal process for casting high-speed aluminum impellers, we must nevertheless continue our constant research for new techniques and methods.

These efforts, we hope, will not only insure production of the highest quality impellers possible, but will lead us into new uses for the centrifugal process on other types of castings.

Good Foundry Lighting

Is a Production Tool

Allyne-Ryan Foundry C

This is the first of three articles covering foundry lighting. It outlines what good lighting entails, explains current recommended practices and highlights economic advantages of an adequate lighting system

By FRANK E. MUELLER
Industrial Sales Promotion
Cleveland Electric Illuminating Co.
Cleveland

FOUNDRY management is giving good lighting top priority in modernization plans. Typical of the job that modern lighting is doing for foundries is the experience of Allyne-Ryan Foundry Co., Cleveland, which reports a 15-per-cent production increase and a better product when coreroom lighting levels were raised.

Buckeye Foundry Co., Cincinnati, increased its shop lighting 12 times, and boosted employee morale simultaneously. R. J. Redmond, secretary-treasurer, says, "Since relighting, our operators have much better working conditions, with the result that the morale of the working force, particularly at night, is much improved. Working conditions more nearly approach our bright day operations with much more satisfaction to both workers and management.

A lighting test in the offices of the Internal Revenue Department, Washington, showed that workers were able to process 5.5 per cent more cards after seeing conditions were improved. Good fluorescent lighting was installed, and walls, ceilings and machines were painted light colors. This increase in production was made although a work change made the job harder.

With the same work load the actual increase

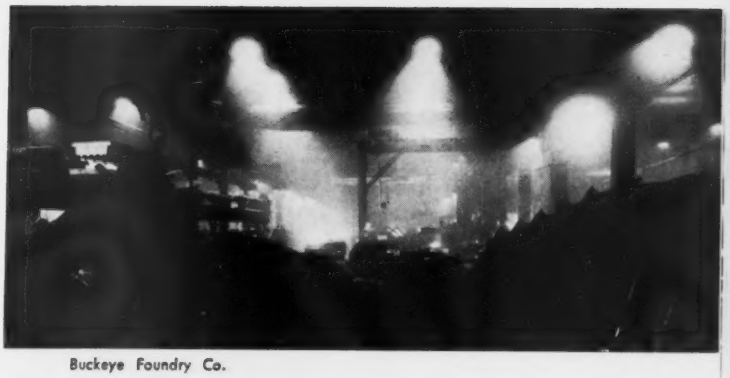
Units of Light Measurement

CANDLEPOWER—Light intensity expressed in standard candles.

LUMEN—Quantity of light. One lumen is the amount of light falling on a 1-sq-ft area, each point being 1 ft from a one-candlepower source.

FOOT-CANDLE—Also called illumination, it is the quantity of light per square foot of surface. Foot-candles equal lumens divided by area.

FOOT-LAMBERT—The average brightness of any surface emitting or reflecting one lumen per square foot.



Buckeye Foundry Co.

Above and left—Before and after views. With 750-w reflector lamps in every other socket the effect above was achieved. Filling all sockets gave illumination shown at left

Far left—General core room lighting is given by 300-w incandescent lamps, direct fixtures

would have been as much as 20 per cent. Yearly savings based on the 5.5 per cent figure still, however, are more than double the cost of the better lighting: A 200 per cent profit is realized on this lighting every year. The test was conducted by government agencies in co-operation with the National Society for the Prevention of Blindness.

Metwood Mfg. Co., Los Angeles, realized these tangible dividends from good lighting in its machine shop: Machine productivity up 16 per cent; reworks and rejects down 26 per cent. R. J. Schoen, secretary-treasurer, says: "Our recently completed lighting system, employing high-output fluorescent lamps, is the most important improvement Metwood has ever made.

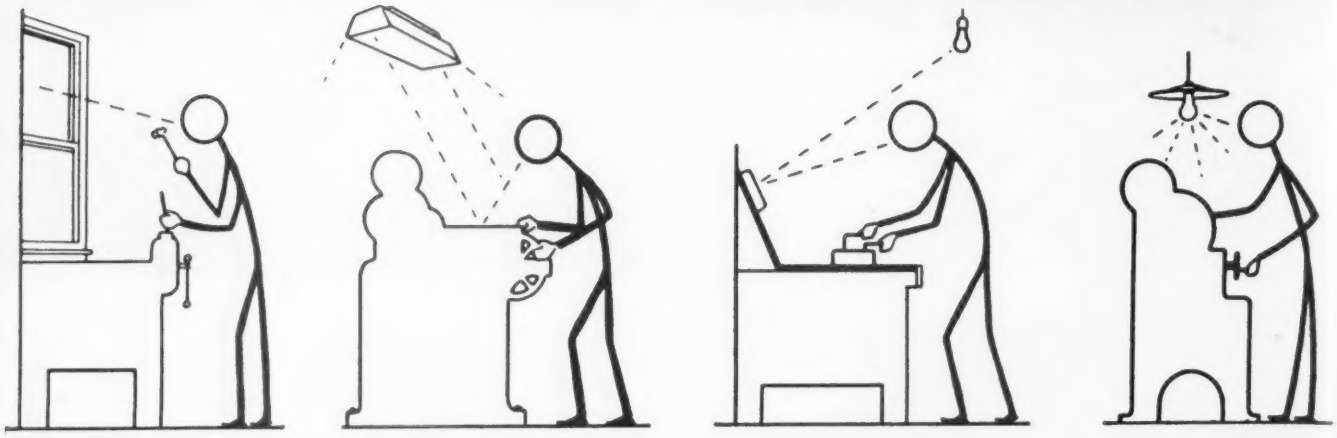
"Before deciding on this new lighting, we analyzed investment and operating costs from the standpoint of our main objective—a measurable increase in productive efficiency. After we compared the initial cost with our investment in machinery and our operating cost with payroll per unit produced, the actual cost seemed small. More to the point, it was evident that the anticipated increase in efficiency justified our making the expenditure. Now that we're actually able to measure results and gage the over-all effect of the lighting on our operation, the cost is low, indeed. We highly recommend that this type of lighting be considered a production tool—it has proven to be exactly that in this plant."

Good Lighting Has Advantages—Many progressive foundries have a continuing program of cost reduction through improvements gained with better engineering and manufacturing techniques. Collective studies are made on every item of cost in the parts or materials used by plants. Engineering, manufacturing and purchasing personnel focus their attention on one objective—equal or better quality or performance at lower cost.

Such sound, realistic cost analysis programs have led to the use of lighting as an important tool in improving over-all operations. Many foundries have found that good lighting helps to accomplish these goals: 1. Cut working time. 2. Reduce fatigue. 3. Allow more efficient use of floor space. 4. Improve employee morale. 5. Reduce turnover and capitalize on investment in older employees. 6. Increase civic and employee pride in their plants. 7. Cut down on spoilage. 8. Prevent accidents and injuries. 9. Produce a higher quality product.

Factors In Seeing—A look at the four factors in seeing will show why lighting is a tool for industry

Examples of Poor Lighting Practice



Strong daylight glare hampers vision. Work should not be placed between windows and workers' eyes. Specular reflections and reflected glare result from light reflected into workers' eyes. They are caused by equipment that does not diffuse light sufficiently or from improperly located supplementary lighting units. Too much light in the eyes and too little on the work causes direct glare. Lighting fixtures may be too bright because they contain oversized lamps. Line vision glare results from improper suspension of lighting fixtures to a point directly in the line of vision. "Roller coaster" lighting has bright and dark areas and is caused by too wide spacing of light sources

and why foundries need good lighting. The ability of workers to see is affected by four factors:

Size—Size of the work or of critical detail is the most noticeable factor. This point is illustrated by the inability of some people to read the small print in a telephone book. Unfortunately, since the size of the work is fixed, not much can be done about it.

Contrast—Color, or brightness contrast of the work with its background, usually is the most influential factor in helping workers to see. The old practice of placing light parting sand about the pouring basin or sprue opening contrasted with the balance of the mold and helped the worker to see.

Brightness—Brightness is a sensation without which seeing is impossible. Objects are visible because they emit or reflect light. Drivers find it difficult to keep their car on the road at night without the aid of the moon or headlights to provide brightness for seeing.

Time—The human seeing-machine, like a camera, requires time to react. Eyes take snapshots in a minimum amount of time when light is abundant, but long-time exposures are necessary when the amount of light is meager.

How Light Helps Ability To See—Good lighting or illumination contributes to the ability to see by affecting the four factors in seeing. Good lighting helps workers see in these ways:

More—The brightness of an object is increased, with resultant better seeing, when more light falls upon an object. For example, windows that appear clean at night show how dirty they are under direct sunlight. A shaft of direct sunlight shows up dust particles in the air which otherwise would go unnoticed. In like manner, more light helps coremakers to note sand particles or other material in a corebox.

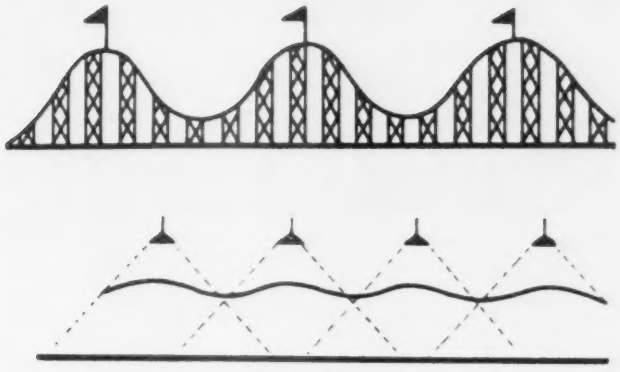
Quicker, Faster—Fireball pitchers often are assigned to pitch night ball games. Big league managers realize that it takes time to see. At night, batters cannot see a fast ball under 250 foot-candles of artificial light nearly so well as they can under as much as 10,000 foot-candles in the daytime. Like a batter, your workers can see quicker with plenty of light. For example, molders can inspect a mold and place cores faster and more surely under good lighting.

Easier—Seeing is facilitated particularly when the correct quality of light is used or consideration is given to lighting surroundings. Greater comfort is gained and less fatigue is felt when the lighting has good quality. For example, the work should be not more than ten times the brightness of the surrounding work area. In good practice, the work is about five times brighter. The lighting fixture should be not more than three times as bright as the surrounding ceiling area.

As pointed out before, brightness aids ability to see. The light which counts most is that which is reflected from the work to the eye. White paper used in office work may reflect as much as 80 per cent of the light, whereas, gray iron castings may reflect only 8 per cent. This difference means that 100 units of light are necessary during inspection of gray iron castings for cracks or other flaws to provide brightness and seeing ability equal to that with white office paper under 10 units of light.

In inspection, grinding and chipping areas, specular surfaces make it advisable to have large-area,

LINE VISION GLARE



"ROLLER COASTER" vs. UNIFORM LIGHTING

General Electric Co.

low-brightness sources for easier seeing. A fluorescent light source allows the worker to note imperfections without being confused or blinded by reflected glare.

More Accurately—Lighting research engineers at General Electric Co.'s Nela Park plant have conducted many experiments on seeing. It was established that when the amount of light was increased from 1 to 100 units, a worker's ability to see fine detail improved 70 per cent.

For the relatively simple seeing task of pouring molten metal into molds, it is not uncommon for the worker to be forced to depend upon light from the hot metal to see the pouring basin. If the pouring basin is not hit accurately, splashing results and sand may be pushed into the mold, causing rejects and possibly burning workers. Poorly lighted obstructions on the floor provide additional hazards to the worker handling molten metal.

In 1952, a report called "Lighting for Foundries" was prepared to guide foundrymen and illuminating engineers in solving seeing problems in foundries. This report is the result of seven years of field studies on seeing tasks and of the effect of illumination on performance of these tasks in modern foundries. It should be studied carefully by any-

Bureau of Internal Revenue

Before proper illumination the office at left had 4 ft-c at the walls and 26 ft-c at windows. Fluorescent fixtures and refinished ceilings, walls, furniture and machines increased light to between 33 and 58 ft-c in the central area

A 400-w straight mercury vapor system in ventilated high bay fixtures gives 20 ft-c of general illumination in this foundry cleaning room. Supplementary fluorescent lighting provides chippers with over 50 ft-c of diffused light

Westinghouse Electric Corp.

one considering relighting a foundry. Nearly 2000 of these reports have been distributed, but some still are available at the headquarters of the Illuminating Engineering Society, 1860 Broadway, New York. Much of the material presented here was taken from that report.

The study committee was comprised of illuminating engineers and representatives of the Malleable Founders' Society, Gray Iron Founders' Society and Steel Founders' Society.

How Is Your Lighting?—A lighting system can be appraised by comparing existing lighting levels with current recommended practice for foundries contained in the IES report on "Lighting for Foundries" and reproduced below. If a foot-candle meter is unavailable or if help is needed to make comparisons, an electric utility sales representative or an illuminating engineer from a local distributor, lamp bulb manufacturer or lighting equipment manufacturer may be called in for consultation.

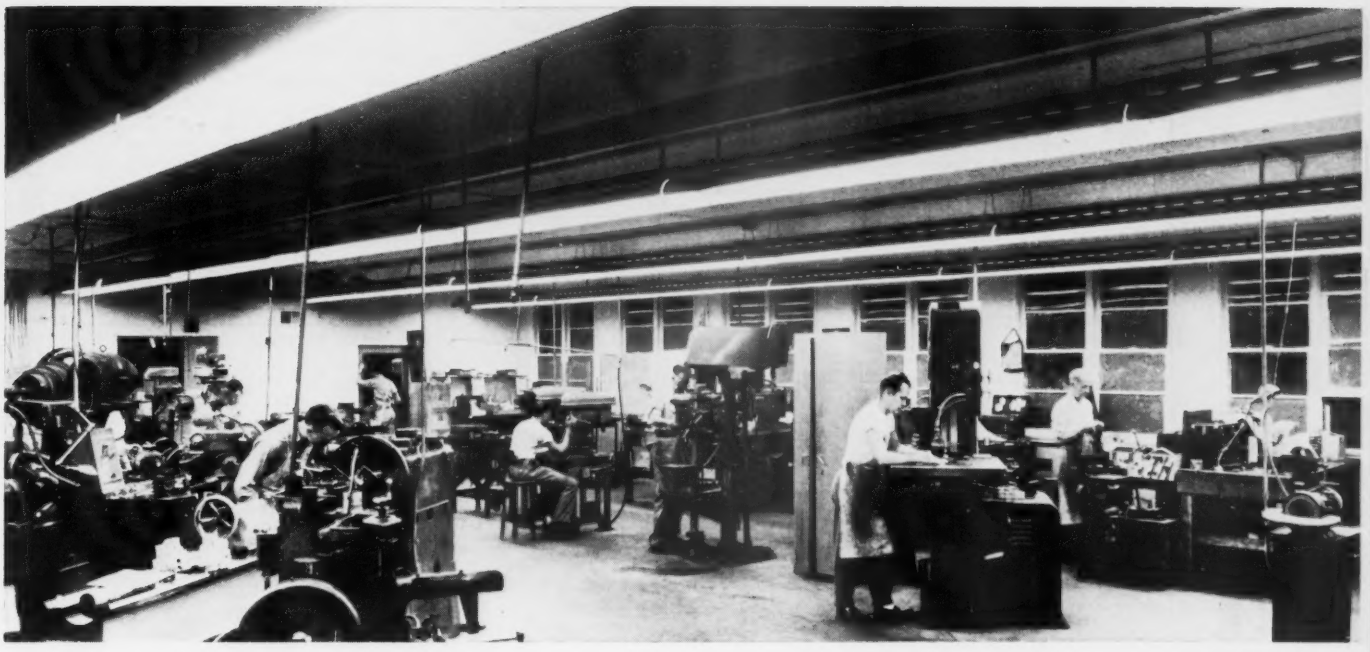
A person's eyes cannot always be trusted to pick out areas with a poor level of illumination. People may become so accustomed to existing lighting that they are unaware that it is below the point of permitting comfortable, accurate seeing. This makes it necessary to check accurately with a foot-candle meter.

Current Recommended Practice for Foundries

Typical Area	*Foot-candles (Minimum Values)*	
Annealing (furnace)	10	
Cleaning	20	
Coremaking		
fine	50	
medium	30	
Grinding and Chipping	30	(plus supplementary)
Inspection		
fine	100	
medium fine	50	
medium	30	
Molding		
medium	50	
large	30	
Pouring	10	
Shakeout	10	
Sorting	10	
Shipping and Receiving	30	
Storage	10	
Cupola charging	10	

The foot-candle values listed above are minimums. Good practice is to use considerably more.

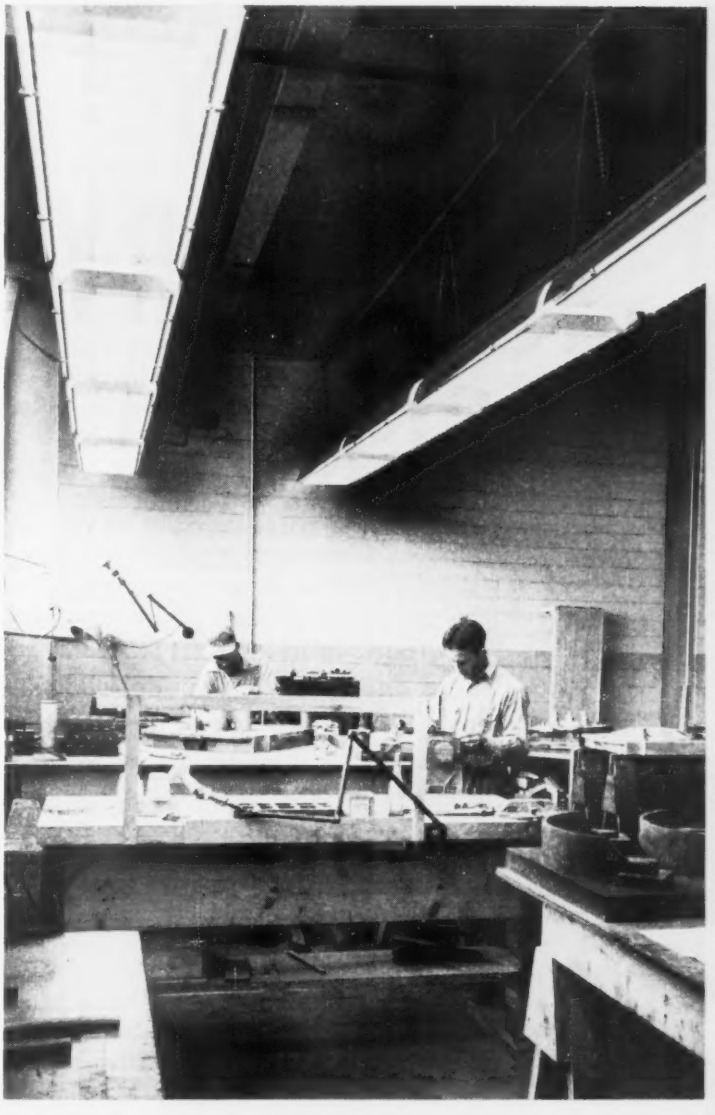
In addition to foot-candle values, the location of work benches and machines should be checked. Good position has the worker facing at right angles



New, 8-ft, high output fluorescent lamps give 200 ft-c of light in this shop. Better worker efficiency paid for the lighting within a year

Metwood Mfg. Co.

This pattern shop is well-lighted by continuous lines of 5-ft fixtures, each equipped with two 90-w fluorescent lamps and egg-crate shielding



to the window area or with his back to it. If the worker is facing windows, brightness of the sky or reflected brightness of buildings constantly causes eye muscles to adjust pupils for brightness extremes. This unnecessary expenditure of energy produces discomfort, nervousness and fatigue.

Are lamp bulbs bare or used in too small a reflector? Use of unshielded lamps or large-wattage lamps in small reflectors causes glare. This condition leads to eye fatigue and nervousness.

Is the worker wearing an eye shade or tinted glasses? A light source in his line of vision probably isn't properly shielded.

Is the worker bothered by a shiny surface which reflects glare from a light source? Either the general illumination is supplied by the wrong light source, or a supplemental light source is improperly placed with respect to the work.

Do you have "roller coaster" or spotty lighting? Light and dark areas in the room are caused by spacing lighting equipment too far apart. This poor housekeeping leads to accidents and inefficient use of floor space.

Is the foundry gloomy and depressing? A low level of lighting with little upward light creates an uninviting work climate which is hard on worker morale.

Do employees take work to a window? If they do, insufficient light probably is supplied for the task they perform.

Do employees squint to see their work? If they do, glare is present, or not enough light is provided.

Are vertical mold surfaces hard to see? If so, lighting equipment is designed primarily for horizontal illumination and should be changed to a different design.

(*To be continued next month*)

ROUGH CASTING SCRAP — DATE 6-12-56

ITEM	PATTERN NO.	MOLDER NO.	DEFECTIVE NUMBER	DEFECTIVE WEIGHT	CODE NO.	REMARKS
1½" 602	1012	12	50		1	
Centerpiece			42		2	
			36		5	
Total			128	116		

Fig. 1—Typical daily scrap report on a selected item would look something like this

Statistical Control of BRASS FOUNDRY SCRAP

The fourteenth in Mr. St. John's series on The Brass Foundry shows how to use statistical records to reduce brass casting scrap to as little as record costs can justify

By HARRY ST. JOHN
Foundry Consultant

THE TERM "statistical control," as used in this article, does not refer to the scientific procedure known as statistical quality control but rather to the use of statistical records as a means for reducing brass-casting scrap to as low a level as the cost of doing so will justify.

Many brass foundries do not keep adequate records; many do not realize how many dollars are lost in the annual cost of their defective castings. Scrap control costs money and one needs to know first of all how much one can afford to spend and how much will be saved if a given scrap goal is attained.

Let us take as an example a foundry having an average daily melt of 20,000 lb and using a variety of alloys, mostly red or semi-red brass. Let us assume that these castings are machined and tested by the foundry company so that all defective castings are found and thrown out in the home plant. This is true of all captive foundries and of many jobbing foundries. Let us also assume that most of the castings are repeaters, made at intervals over a considerable period of time. The foundry staff is competent and using its best judgment but the over-all scrap is running 10 per cent-5 in the foundry and 5 per cent due to foundry defects found after machining.

At a 50 per cent gross-casting yield, this foundry will produce about 2,400,000 lb of rough castings per year, of which 240,000 lb will be defective. Let us suppose that, after the weight of the scrap castings has been credited for remelt, the loss for castings scrapped in the foundry amounts to 15 cents per pound and for castings scrapped in the shop 40 cents per pound. These are conservative figures which will often be exceeded. The loss from the 120,000 lb scrapped in the foundry will then amount to $18,000, while the loss due to scrap in the shop will be $48,000, a total of $66,000 per year. Probably half of this can be saved by intensive scrap control, which should not cost

1956 JUNE	MONTHLY PRODUCTION AND SCRAP											
	1 MELT	2 ACCUM. MELT	3 GROSS CSTGS.	4 ACCUM. CSTGS.	5 PERCENT CSTGS.	6 C.R. SCRAP	7 ACCUM. C.R. SCRAP	8 SHOP SCRAP	9 ACCUM. SHOP SCRAP	10 PERCENT C.R. SCRAP	11 PERCENT SHOP SCRAP	12 PERCENT TOTAL SCRAP
1	18560	18560	9260	9260	50.0	429	429	412	412	4.63	4.45	9.08
2												
3												
4	21231	39791	7432	16692	41.9	532	961	522	934	5.75	5.60	11.35
5	20465	60256	10822	27514	45.6	469	1430	906	1840	5.20	6.69	11.89
6	19621	79877	11413	38927	48.7	213	1643	413	2253	4.22	5.78	10.00
7	19843	99710	8364	47291	47.5	645	2288	328	2581	4.85	5.45	10.30
8	20562	120272	9220	56511	46.9	564	2852	743	3324	5.05	5.88	10.93
9												
10												
11	21316	141588	10453	66964	47.3	816	3668	505	3829	5.48	5.72	11.20
12	19889	161477	9018	75982	47.1	336	4004	481	4310	5.27	5.08	10.95
13												
30												
31												

Fig. 2—Monthly chart like this one shows production and scrap and is a useful guide

the foundry more than $10,000 at the outside.

How To Start—A good way to start is to appoint some bright young fellow as official scrap investigator. He will need a good deal of guidance at first, less as time goes on. His first job will be to select a few items for study. These subjects should include some which run in largest volume, others of less volume which are known to be troublesome.

Referring to the most recent articles in this series, a list of foundry defects should be made out and a code number assigned to each. This list can, of course, be expanded or modified to suit the foundryman's preference. All scrap castings in the selected items should be inspected and the defects listed by code number. A daily report on one such item would look something like Fig. 1.

It is presumed that all castings are inspected before delivery to the machine shop in order to avoid useless expenditure of work on defective castings, also that the total weight of the scrap castings is recorded. A monthly chart, in which the weight of castings is accumulated daily, is a useful guide to what is going on. As illustrated in Fig. 2, Column 1 shows the melt, day by day, Column 2 the melt for the month to date, Column 3 the weight of gross castings day by day, Column 4 gross castings to date. Column 5 shows, for the month to date, the ratio of gross castings to total melt; it is obtained by dividing Column 4 by Column 2, then multiplying by 100 to express in percentage.

The recorded weight of gross castings is the sum of good castings delivered to the machine shop and scrap castings rejected because of defects and returned to the metal room for remelting. Since these weights are not recorded until the cleaning room has completed its work on the castings, it is apparent that if the cleaning room is falling behind, the figure for per cent gross castings will be unduly low.

The foundryman's reaction at this point should be something like this: "That gross-casting figure is lower than I thought it would be. We seem to be getting less than 50 per cent yield and I'm told that some foundries get 60 per cent or more. Maybe castings are piling up in the cleaning room; I'd better have a look. If the cleaning room is up-to-date our yield is sure out of line and we'd better find out why."

Low Yield Requires Study—The study and correction of low casting yield is a long process and will not be dealt with in detail here. It may be due in part to metal loss or spillage, matters which have been discussed in a previous article. (See FOUNDRY, January, 1956, page 84). It may also be due to excessive gating and risering which will be covered in a future article. The point to be noted at present is that the statistical record has pointed a finger at trouble caused either by slow work in the cleaning room—which can be quickly checked—or by a low casting yield inherent in the foundry practice, a matter which deserves prompt and intensive study.

Returning to Fig. 2, Column 6 gives the daily scrap weight in the cleaning room, Column 7 the accumulated weight. Columns 8 and 9 do the same for scrap found in the machine shop. Column 10 gives the percentage of cleaning room scrap based on gross castings (Column 6 divided by Column 3 and converted to percentage), while Column 11, in a similar way, shows the percentage of shop scrap. Column 12 gives the total scrap—the sum of Columns 10 and 11.

Again, as in the case of casting yield, this report gives evidence of an undesirable condition. An over-all scrap loss of more than 10 per cent is much too high, and means must be found to reduce it. The first problem is to learn definitely which items are responsible for high scrap and which individual foundry defects have contributed most to the loss.

ROUGH CASTING RECORD — JUNE 1956

ITEM	PATT.	MOLDER	CSTGS. MADE	GOOD CSTGS.	DEFECTIVES 1	2	3	4	5	6	7	8	9	M	TOTAL	PCT.	PCT.	WT.	DISCREP.
1½" 602	1012	12	2016	1506	200	153	11	4	135	18	6	6	4	3	490	24.5		443	20
A 53	496	6	990	950	4	2	5	8		2		3	5	5	34	3.5		68	3
946	818	3	2418	2190	22	8	6	10	4	3		2	2	3	60	2.7		55	168

Fig. 3—Rough casting record, a form practically identical to one for rough casting scrap (Fig. 1), lists defects found after machining, testing and final inspection

A form practically identical with that shown in Fig. 1 serves to list the defects found after machining, testing and final inspection. It takes a little time to gather the necessary information, but after a month or two the scrap investigator has enough to make a start. To be of much use, however, the information on the scrap tickets must be tabulated and the number of castings scrapped compared with the number made. Fig. 3 shows how this may be done.

As soon as the cleaning room reports that a complete run of castings has been delivered to the machine shop, the scrap tickets for the item in question can be totaled and entered on the form shown in Fig. 3, which should have space for 12 or 15 entries.

The figures in Column 4 are obtained by multiplying the number of castings in a mold by the number of molds made. Column 5 is the cleaning room's report of castings delivered to the shop. The columns under defects list the totals from the daily scrap reports (Fig. 1). The numbers in the headings are the code numbers which designate the type of defect. These are totaled and the percentage of scrap calculated by dividing this number by the number of gross castings—that is, the number of castings delivered plus the number scrapped.

The last column illustrates why the number of gross castings does not correspond exactly to the number of castings supposedly made, as listed in Column 4. With small castings there is almost always a discrepancy, a few castings which cannot be accounted for either as good castings or as scrap. So long as the discrepancy does not amount to more than 1 or 2 per cent it may be considered normal and need cause little concern.

Pointing to the Trouble—When we examine the table in Fig. 3 we notice first of all that the 1½-in. No. 602 scrap is very high. If Code 1 stands for misruns, Code 2 for cold shuts and Code 3 for shrinks, it is at once apparent that gating and pouring temperature need attention. It will be one of the scrap investigator's first jobs to bring this to the attention of foundry supervision. The other scrap causes are relatively minor. The remaining two items on the list, No. A53 and No. 946, show below-average scrap but No. 946 deserves another look because of the large discrepancy between castings made and castings accounted for.

It has been mentioned that a discrepancy of 1 or 2 per cent can be overlooked. A few castings are broken in the foundry to examine the fracture. Now and then one is lost in the sand at the shakeout. The counts may not be absolutely accurate and it will happen occasionally that the number of castings accounted for is greater than the number made. A mold runout will result in a gate of castings so completely misrun that it would be a waste of time to cut them off and count them.

But in this run of 946 we find almost 7 per cent of the castings completely missing; something must be wrong. They might be mislaid in the cleaning room but a search there fails to find them. There is a possibility that some of the scrap went back to the furnaces without ever reaching the cleaning room. The fact that the total scrap is unusually low but the percentage of misruns rather high lends color to this thought. The discrepancy is called to the attention of foundry supervision and they are cautioned. The remaining possibility is that the molder was paid for molds he never made. A note is made to watch the record of Molder No. 3 on future jobs. The best laid schemes for counting molds sometimes fail.

A form similar to Fig. 3 is used to list scrap castings rejected in the machine shop. This completes the scrap information needed for a study of each troublesome item. The form shown in Fig. 4 then provides a permanent record of each individual item with one line for each run and sufficient lines to record performance over a considerable period of time. This record is retained in the file so long as the item continues active, showing at a glance its case history.

The Next Step—Let us go back to our original bad actor, the 1½-in. 602 centerpiece. As soon as his data for the June, 1956 run are complete, the scrap investigator requests a meeting which is attended by supervision from the foundry, coreroom, cleaning room and pattern shop. Exhibits are the cores, pattern, scrap castings and the records already described. Examination of the pattern results in agreement that, while the gating is by no means ideal, it cannot be improved without taking two pattern pieces off the plate. It is decided to try to avoid this situation by increasing the pouring temperature from 2200°F to 2240°F and to limit the molds poured from one pot to 15, where about 20 had been the practice. A tag, such as shown in Fig. 5, is attached to the pattern.

When the pattern comes out of storage for the

1½" 602 CENTERPIECE PATTERN 1012

FILE RECORD

DATE	MOLDER NO.	CSTGS. MADE	GROSS CSTGS.	PCT. C.R. SCRAP	PCT. SHOP SCRAP	TOTAL PCT. SCRAP	DEFECTIVES 1	2	5	6	14	18	20	22		M	TOTAL
JUNE 56	12	2016	1996	24.5	10.3	34.8	200	153	135	18	106	50	50			34	696
JULY 56	12	1600	1590	5.2	2.8	8.0	20	12	6	15	20	13	12	20		10	128

TRIAL

PATTERN NO. 1012

1½" 602 CENTERPIECE

2240

15 MOLDS

CODE 1, 2.5

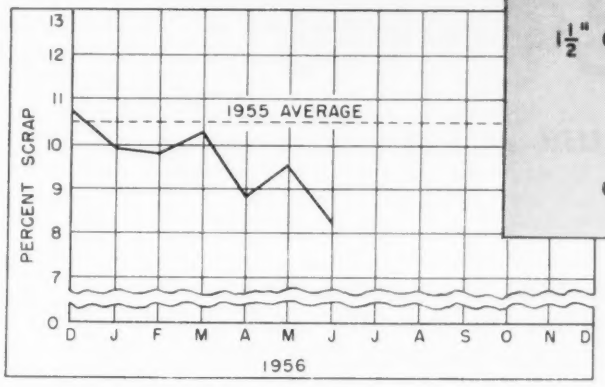


Fig. 4 (above)—File record form is a permanent record of individual items produced

Fig. 5 (left)—Tag attached to pattern warns a foreman of causes of scrap in past

Fig. 6 (far left)—A chart of this type should be kept up to date and posted on the bulletin board

next run the foundry foreman is warned by the code numbers on the tag that misruns, cold shuts and shrinks have been responsible for scrap in the past. He knows he must watch his pouring temperature and must not exceed the 15-mold limit. The word "Trial" also instructs him to fracture some of the first castings poured to make sure that the new pouring temperature can be tolerated.

The results of the second run show great improvement and the word "Trial" is deleted from the pattern tag, since the instructions are now permanent. The scrap investigator makes a record of the changes that have been made. He also notes the fact that the increased pouring temperature has resulted in some gas porosity (Code 22) showing up in the machined castings and from this knows that a further increase in pouring temperature would be unwise.

Now suppose that a couple of years go by and, after a consistent performance of 5 to 8 per cent scrap, the centerpiece again breaks out in a rash of misruns and shrinks. A glance at the record indicates that the operating instructions should not be changed. Either there has been a failure to follow instructions or some of the metal in the bad run was off-standard. Foundry supervision is cautioned and the matter is treated as a one-time occurrence. A run showing an excess of gas porosity would be handled in the same way.

By this procedure there is no reliance on anyone's memory and many false moves are avoided. Futile gate changing is a common foundry fault and an expensive one. The best way to avoid it is to have a case history of the casting.

Weekly Discussion—The scrap investigator will ordinarily have several cases for consideration at a scrap meeting. Meetings should be held as often as important material is available for consideration, usually about once a week. In a foundry of the size we are considering the investigator will have time to keep all necessary records but will not be able to handle the scrap inspection. For inspection someone familiar with the appearance of foundry defects is needed. Machine shop inspection is not of much help, and castings returned from the shop will need to be diagnosed by a foundryman. Perhaps a man who has served for years in the foundry and is in need of lighter work will be available. Experience, intelligence and conscientiousness are the essentials.

Perhaps someone will question why we have sometimes referred to scrap by weight of castings, sometimes by number of castings. It will be found that the use of numbers is most helpful when we are dealing with one item but that when considering the over-all scrap or the influence of an item on the over-all scrap we must deal with weights.

The procedure described in this article pays dividends. In the writer's own experience he has seen one foundry reduce its scrap from 12 per cent to 3 per cent, another from 16 per cent to 6 per cent. A couple of years may be required before the full effect of the program is realized but there should be benefits evident in six-months' time. Once established, intensive scrap control needs to be continued indefinitely. If it is allowed to lapse, the foundry will inevitably slip back into its former condition. It is important to keep the foundry personnel interested and informed regarding the progress of the scrap campaign. Fig. 6 illustrates a type of chart which should be kept up to date and may be posted on a bulletin board.

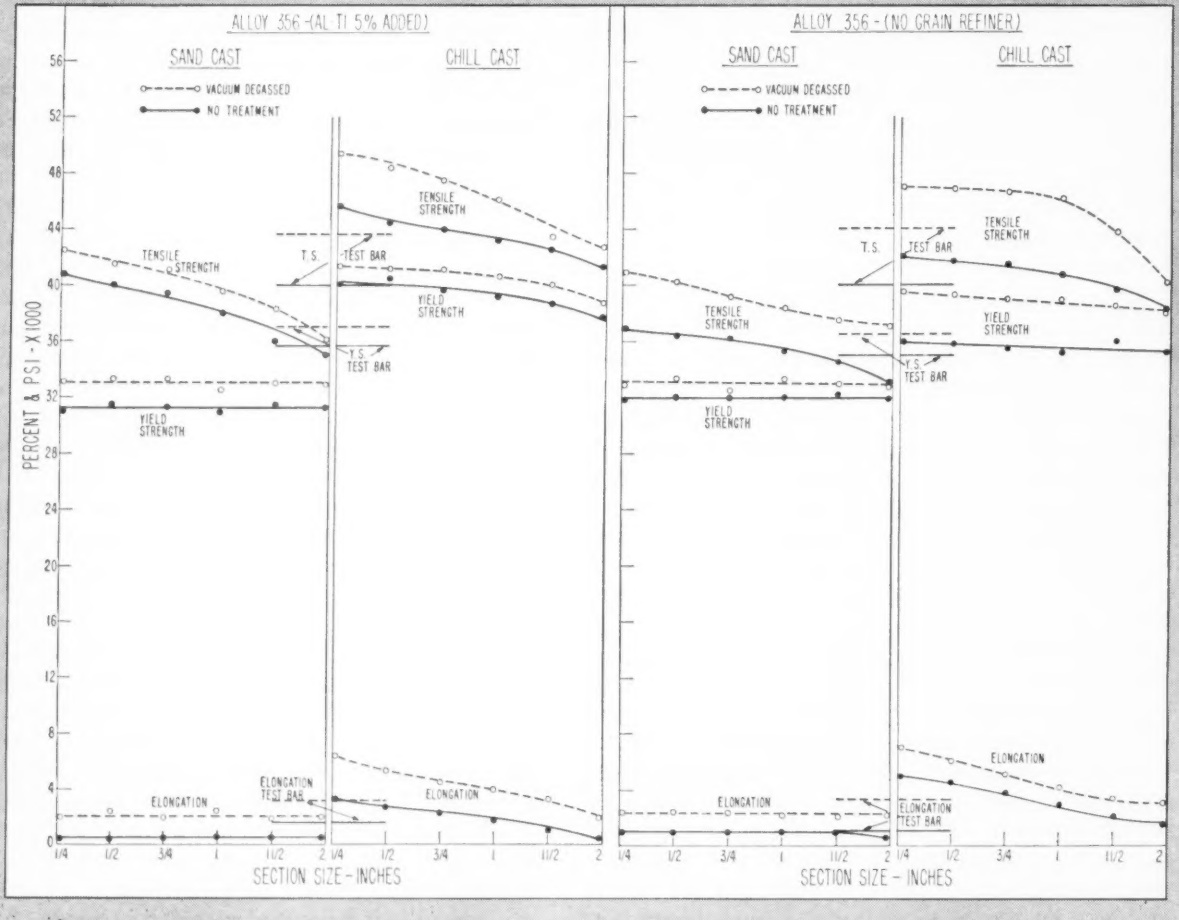
To one more familiar with iron and steel practice, such detailed scrap control may seem unnecessarily elaborate. The difference lies in the peculiar solidification characteristics of most nonferrous alloys. General good foundry practice is not enough. Each casting must be treated as an individual problem, just as the doctor finds that no two of his patients are exactly alike. The forms illustrated can be varied to suit the needs of each foundry, provided the essentials are retained.

Effect of Vacuum Degassing

On Properties of Aluminum Alloys

Vacuum degassing has been shown to be a fast, inexpensive way of eliminating gas porosity in nonferrous castings. This study describes how the process affects mechanical properties of aluminum

By E. E. LAYNE and H. F. BISHOP*
Metal Processing Branch, Metallurgy Division
Naval Research Laboratory
Washington, D. C.



IT HAS been demonstrated[1] that gas porosity can be eliminated from nonferrous castings by holding the melt in a vacuum chamber for 5 to 10 minutes prior to pouring.

This procedure does not require the expensive equipment generally associated with vacuum melting; a mechanical pump is sufficient to bring the pressure within the chamber down to the 0.2 to 0.4 mm range required. Vacuum degassing does not require major modifications in foundry procedures since it involves less time than is often required for conventional inert gas flushing to remove hydrogen.

The present study was initiated to determine the extent to which gas elimination by vacuum treatments may improve the mechanical properties of aluminum alloys. The effects of gas removal are interrelated with the effects of section size, mold media and grain refining additions to the melt.

Experimental Procedures—Five aluminum alloys of the compositions listed in Table I were cast into step bar castings and separately cast test bars as shown in Fig. 1. The B-195 alloy step casting was made in a chill mold only, while the remaining four alloys were cast into step castings made in both sand and chill molds. In the sand mold the

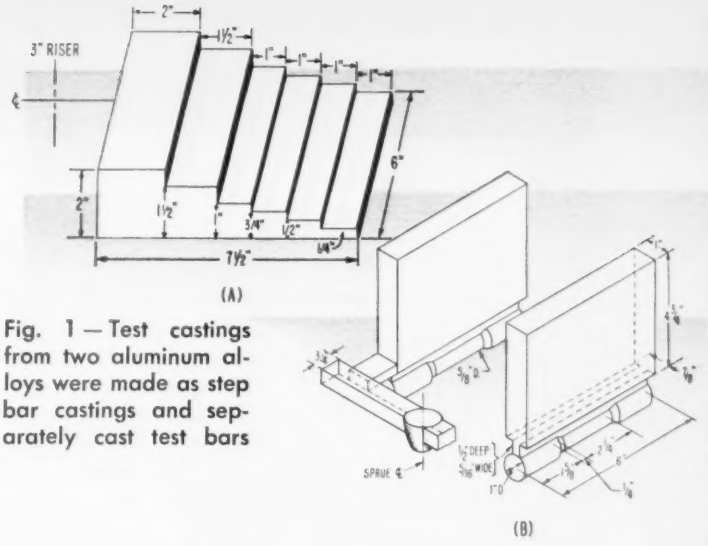


Fig. 1 — Test castings from two aluminum alloys were made as step bar castings and separately cast test bars

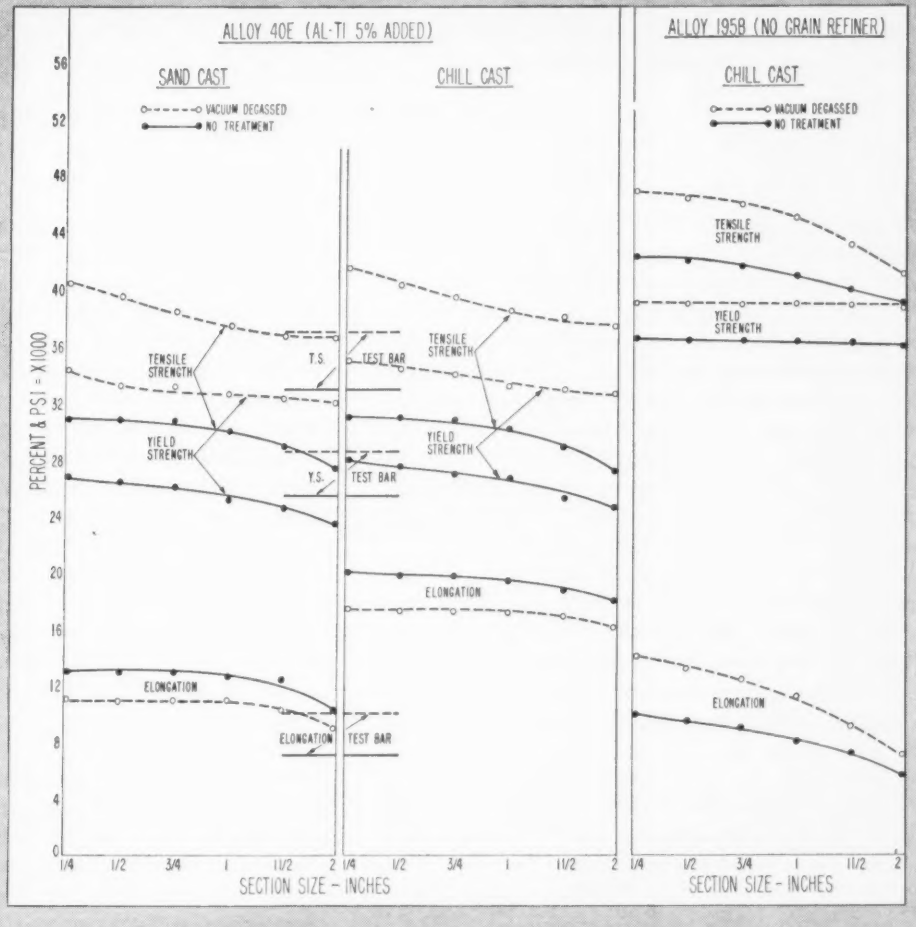
castings were poured in the horizontal position with the riser attached to the end having the heaviest section. The chilled casting was poured in the vertical position "ingot fashion" through a top riser on the heavy section.

The sand molds were made with an AFS No. 80 sand bonded with 3.0 per cent bentonite, 1.5 per cent dextrin, 0.5 per cent Mogul and 3.0 per cent water and were air dried for 24 hours prior to pouring. Inhibitors were added to the sand mixtures for the 220 aluminum alloy castings. The

*Since this article was written, Mr. Bishop has left the Naval Research Laboratory to join Exomet Inc., Conneaut, O., as technical director.

Fig. 2 — Sketch at left shows properties at various locations in the 356 alloy step castings

Fig. 3 — Sketch at right shows properties at various locations in 40E and B-195 aluminum alloy step castings



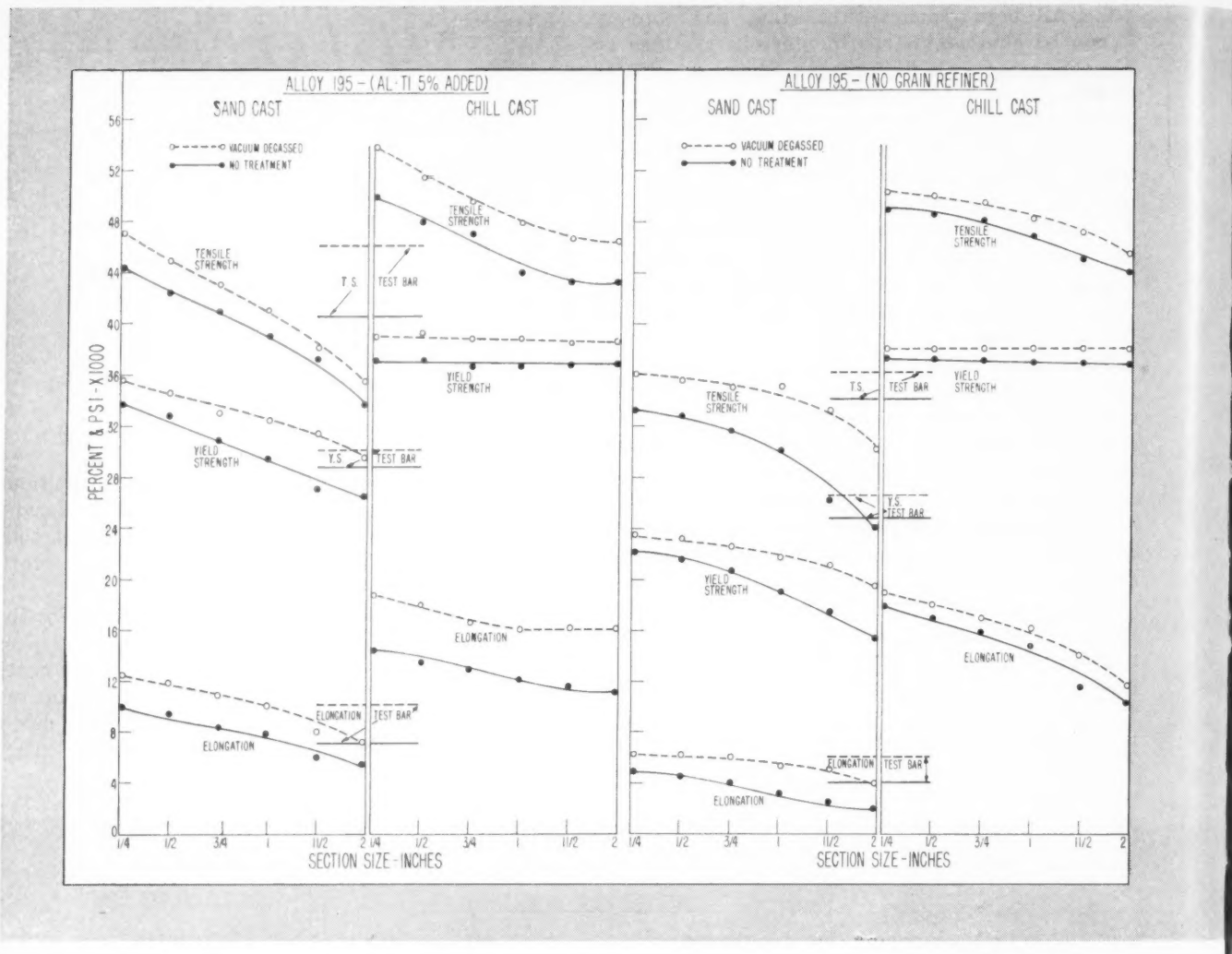


Fig. 4—Properties at various locations in the 195 alloy step castings

chill molds employed were cast with gray iron.

Seventy-pound heats consisting of 50 per cent foundry returns and 50 per cent virgin metal were melted in a high-frequency induction furnace. Sand and chill mold step castings and separately cast test bars were poured at 1250°F with nonvacuum-treated metal. The remainder of the melt was returned to the furnace, superheated, held in the vacuum chamber for 12 minutes, during which time the pressure within the chamber was lowered to approximately 0.3 mm, and a second series of castings was poured also at 1250°F.

With the exception of the B-195 and the 40E alloys, the alloys of Table I were cast both with and without grain refiners added to the melt; the B-195 alloy was made only without the grain refining additions. For the series containing grain refiners, 0.20 per cent titanium as an aluminum-5 per cent titanium alloy was stirred into the melt prior to pouring. This necessitated transferring half of the original melt to a second crucible for the grain refining treatment in order to maintain comparable melt treatment conditions for both the nontreated and vacuum-treated fractions.

TABLE I Compositions of Alloys Tested

Alloy	Heat Treatment	Cu	Si	Mg	Zn	Cr	Ti*
195	T6	4.1/4.15					
B-195	T4	4.3/4.4	2.8				
356	T6		6.7/7.0	0.32/0.35			
220	T4			9.4/9.8			
40E**				0.60	5.3/5.4	0.50	0.20

*In cases where grain refiners were added alloys contained 0.15 to 0.20% Ti. ** Aged at room temperature 100 hours.

Standard 0.505-in.-diam tensile test bars were machined from the separately cast test bar and from all except the ¼ and ½ in. sections of the step casting. Tensile test bars having cross sections of ¼ x ½ in. were obtained from the two smallest sections of the step castings.

The heat treatments indicated in Table I were conducted in a circulating air furnace of the type usually used for the heat treatment of aluminum castings.

Data Obtained—Tensile properties as determined from the step castings are shown in Figs. 2 to 5. The average properties obtained from separately cast test bars are indicated in Fig. 6 for the various conditions of melt treatment and are also shown in the appropriate charts of Figs. 2 and 5 to facilitate comparison with the properties of the step castings.

Regardless of the mold media and melt treat-

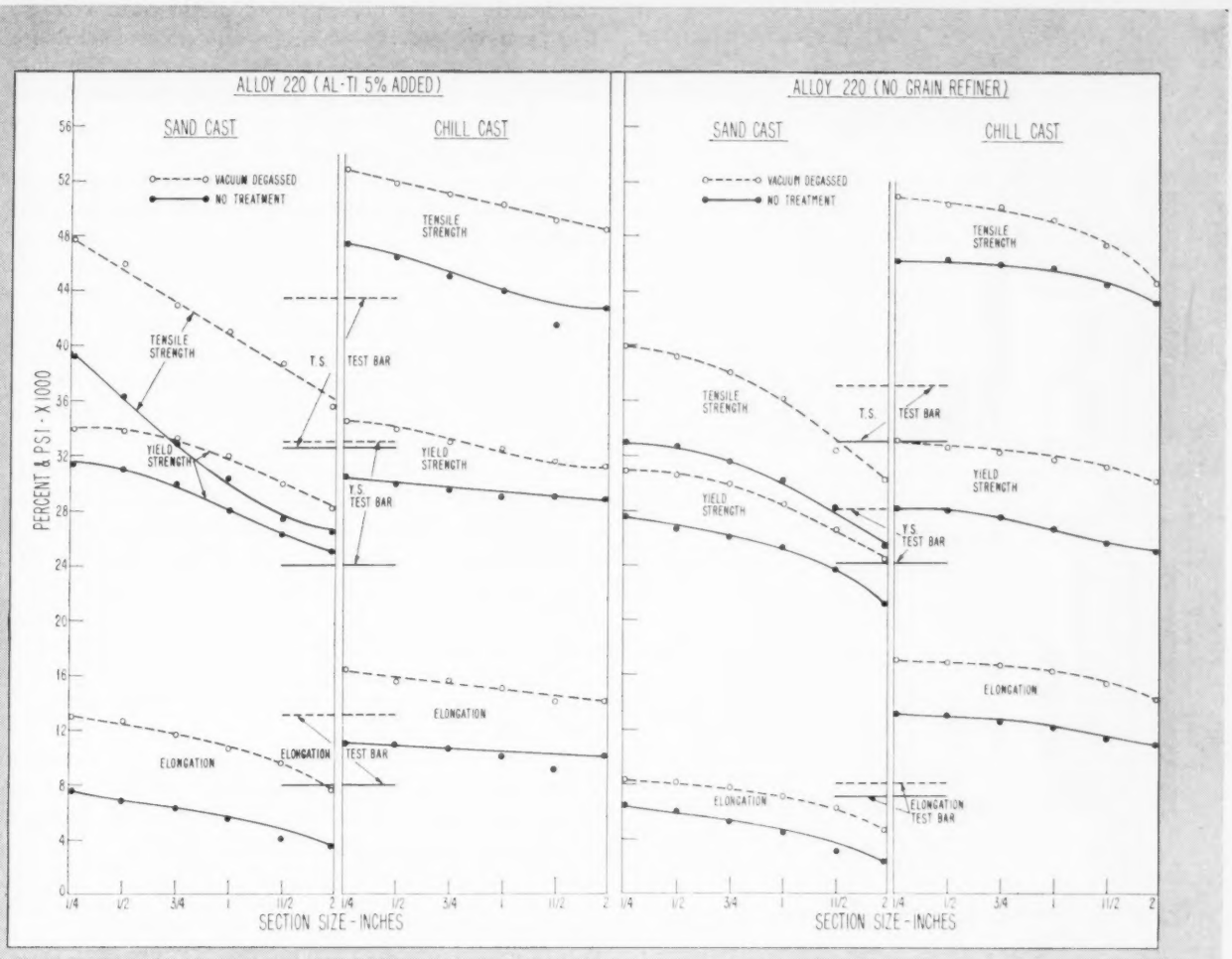


Fig. 5—Properties at various locations in the 220 alloy step castings

ment, vacuum degassing results in improved tensile strengths, yield strengths, and elongations with the exception of elongation values for the 40E alloy, Fig. 3. In the case of the 40E alloy, elongation values are slightly less in the vacuum-treated castings than in the nontreated castings, but this is more than compensated for by the marked improvements which result in yield and tensile strengths; tensile strengths are increased 8000 psi accompanied by only 2 per cent decline in elongation values. Vacuum degassing causes similar strength improvements in the 220 alloy, Fig. 5, along with increased ductility.

Typical gas porosity conditions in the sand and chill mold step bar castings are shown in Fig. 7. Gas porosity was noted to be more pronounced in the heavy sections than in the light sections and was absent in the castings poured with vacuum treated metal.

Other Factors Contributing to Soundness—It is apparent from the properties presented in Figs. 2 to 5 that gas elimination alone does not provide for the ultimate in casting soundness and mechanical properties of aluminum alloy castings. Whether or not the melt is vacuum degassed, grain refining additions are necessary in sand mold casting, particularly the 195 and 220 alloys, in order to obtain optimum mechanical properties but are of minor importance for chill cast alloys.

The solidification mode of an alloy also affects casting soundness and mechanical properties. It has been shown[2,3] by thermal analyses studies that aluminum alloys, because of their high thermal conductivity, develop only very mild thermal gradients across a solidifying section. Such a thermal condition indicates a tendency toward nonprogressive solidification. Nonprogressive solidification is essentially uniform solidification over the entire casting section rather than solidification by wall growth into clear liquid from the mold-metal interface toward the centerline of the section (progressive solidification).

A high degree of both progressive solidification and directional solidification (increasing rates of progressive solidification as the distance from the riser increases) are necessary in a casting if feeding to complete soundness is to be obtained. Directional solidification provides conditions favorable for the longitudinal flow of feed metal along the casting section; progressive solidification provides conditions favorable for lateral flow of feed metal between dendrite interstices. When both of these

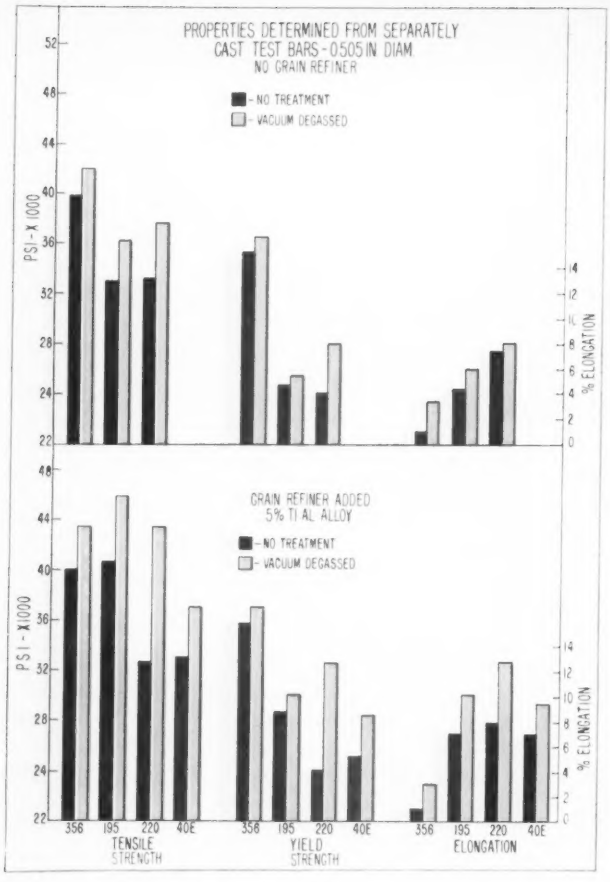


Fig. 6—Properties of separately cast test bars

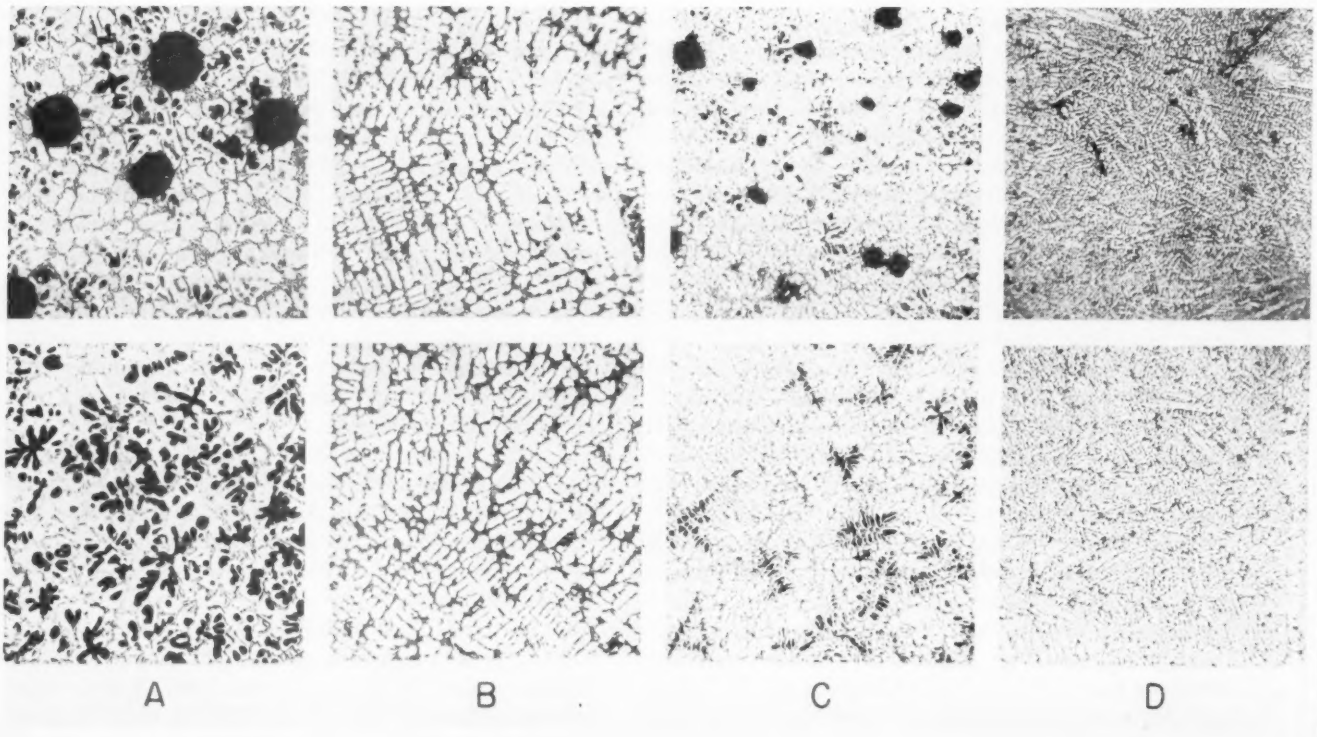
conditions do not prevail, feed metal cannot reach the last regions to solidify and microshrinkage voids develop throughout the casting. When sufficient gas is present to precipitate during solidification, the microporosity may be due to gas or to both shrinkage and gas.

The design of step casting employed in this investigation is such that a high degree of directional solidification is assured. Since vacuum degassing removes the gas component of microporosity, differences in mechanical properties along any of the step castings of Figs. 2 to 5 poured with vacuum-treated metal may be ascribed to lack of a sufficient degree of progressive solidification which makes lateral feeding increasingly more difficult as the section thickness increases.

The undesirable, nonprogressive type of solidification promoted by inherent high thermal conductivity characteristics of aluminum alloys tends to be counteracted in mold media of high thermal diffusivity and in alloys having short liquidus to solidus temperature ranges[2]. The liquidus to solidus temperature ranges of the four alloys investigated under conditions of sand and chill mold media are, in order of increasing ranges, those of 40E, 356, 220 and 195[3,4].

More complete feeding is obtained in the sand mold 40E alloy step casting than in the castings made with the other alloys, as indicated by the fact that its mechanical properties are relatively insensitive to both section size effects and to the increased thermal diffusivity of the chill mold, Fig. 3. On the other hand, the 195 and 220 alloys, Figs. 4 and 5, which have long liquidus-to-solidus ranges, solidify in a very mushy fashion in sand molds. This circumstance makes them difficult to feed; as a result there is a pronounced difference in tensile strength between ¼ and 2-in. sections of

Fig. 7 (below)—Microstructures of nondegassed (top row) and vacuum degassed (bottom row) 356 alloy step castings: A—1-in. section, sand cast. B—¼-in. section, sand cast. C—1-in. section, chill cast. D—¼-in. section, chill cast



the sand mold step castings made with this alloy.

Improvements of still greater magnitude occur in comparable sections of the 220 and 195 alloy step castings when the mold media is changed from sand to chill. The influence of mold and section size variables upon the 356 alloy, Fig. 2, is intermediate between that of the 40E alloy and those of the 195 and 220 alloys, as would be predicted from its relative liquidus-to-solidus temperature range.

The resultant effects of mass, mold media and liquidus-to-solidus temperature range upon solidification mode—hence completeness of feeding—are reflected in the densities of the metal along the degassed step bar castings, Fig. 8. It may be noted that the densities of the 40E and 356 alloy step castings made in sand molds are not as sensitive to section thickness as are those of the 195 and 220 alloys, which have longer liquidus-to-solidus temperature ranges. Also, the densities of the 356 and 40E alloys are improved to a lesser extent by casting them in chill molds than are those of the 195 and 220 alloys. This result indicates again that the more nonprogressively the alloy solidifies the more responsive it is to the effect of chilling.

The desirable solidification features of alloys and expedients such as chills cannot be utilized to their fullest extent, however, unless the melt has been adequately degassed. When gas porosity forms, feeding is curtailed and may be prevented completely; in such cases densities and mechanical properties throughout the castings are governed primarily by the amount of gas present.

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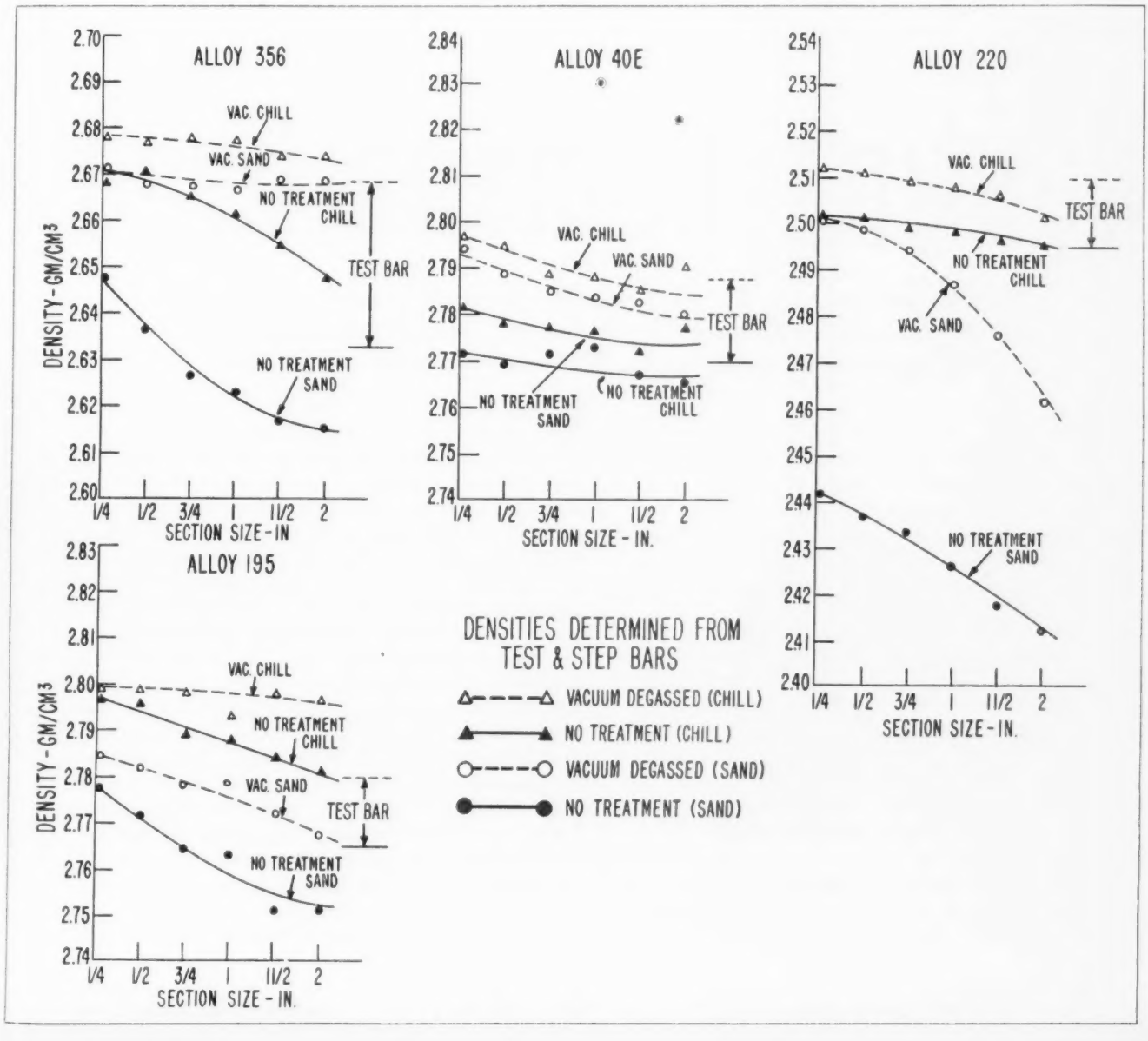
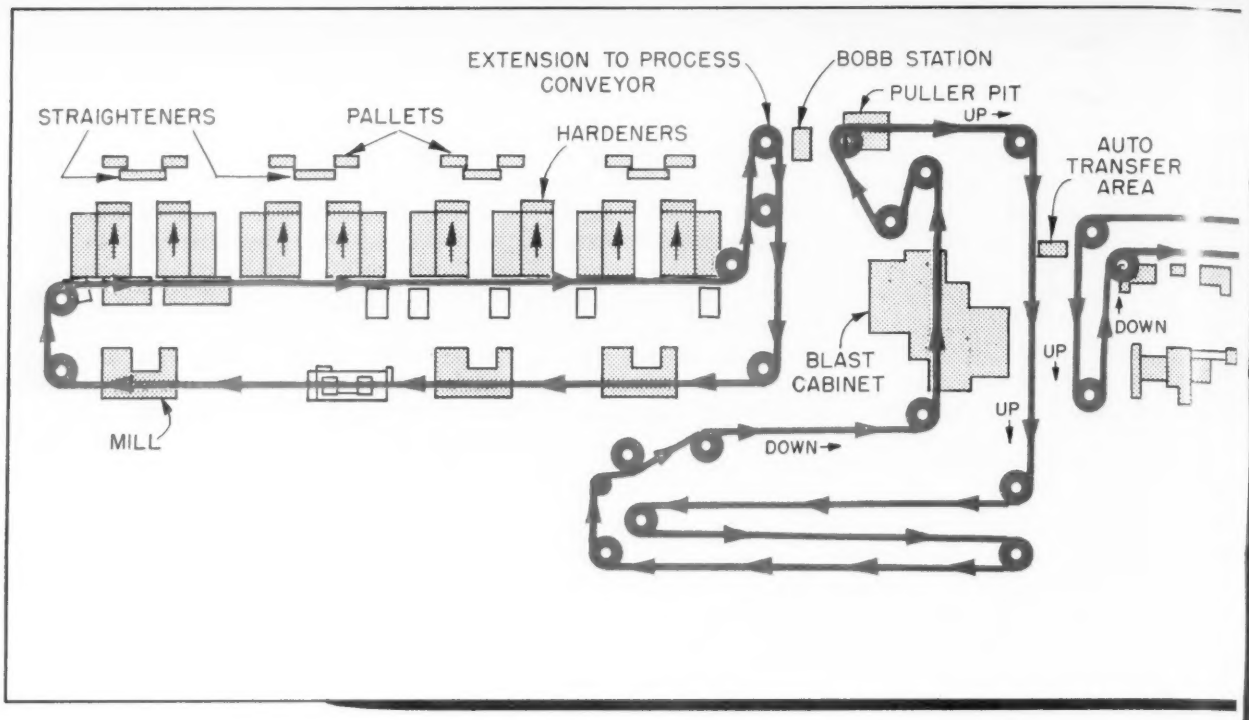
4. *ASM Handbook.*

Fig. 8—Densities at various locations in step bar castings without grain refinement





Casting Camshafts in

Mechanized line that features three automatically controlled blow-hot press machines of special design has more than doubled the output of camshafts at the Defiance, O., plant of General Motors Corp.

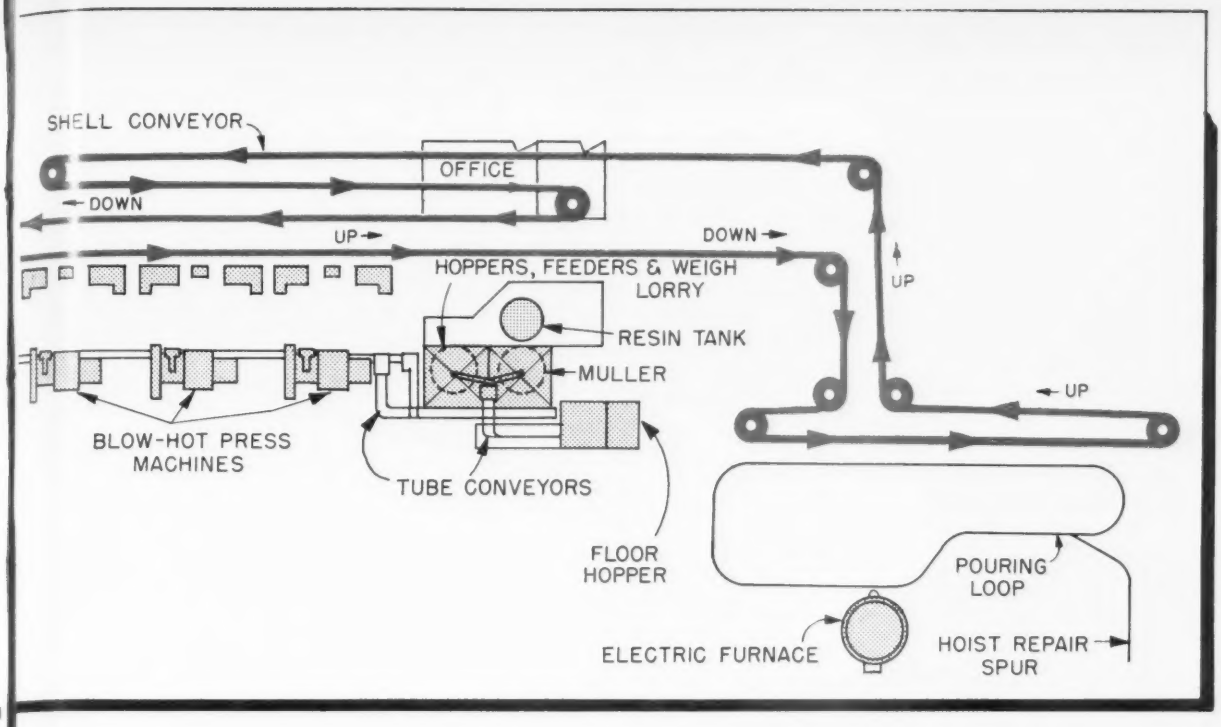
A MECHANIZED shell molding line featuring three automatically controlled blow-hot press machines of special design is producing 600 camshafts per hour at General Motors Corp.'s Defiance, O., plant. Camshafts are for use in the company's Buick, Oldsmobile and Pontiac automobiles.

The blow-hot press machines were the result of a co-operative development program between G. M. Research Staff and Central Foundry Division and were built at the new G. M. Technical Center. They are designed to increase production speed of shell molds by reducing to a minimum the investment and curing cycles. This has been accomplished by blowing a pre-determined amount of resin mix on a hot pattern and then "assisting" the cure by introduction of pressure. This combination of controlled amount of mix and pressure has speeded up the technique to 50 completed shells per machine per hour. Each shell mold contains four camshafts.

Sand Preparation—Sand for the shell system is transferred from the general sand storage area in trucks and dumped through a grating screen at floor level into an underground storage bin of 3-ton capacity. Selector switches control elevation of sand by tubular conveyor to overhead storage bins of 15-ton capacity. Two sands are used, one a Juniata bank sand of 105 AFS fineness and the other a Nugent lake sand of 45 AFS fineness. A vacuum tube system raises resin from drums to an overhead storage bin.

Sands and resin drop from storage hoppers into vibrators and are carried to a weigh lorry for automatic weighing of mix ingredients. The lorry empties material into a muller for intimate mixing. The batch is released from the muller into a tubular elevator for movement to an overhead conveyor integrated into the storage hoppers above each of the three molding machines. Level indicators in the hoppers control the amount of mix to be added to each hopper.

Each batch weighs about 1600 lb and contains about 1050 lb of Juniata sand and 450 lb of Nugent sand. A special mix formulation provides the green strength to prevent blow tubes from



Schematic layout of blow-hot press line

Shell Molds

By KENNETH L. MOUNTAIN
Associate Editor

emptying or flowing free after each blow and still give the mechanical strength to permit blowing on vertical pattern details without sagging when withdrawn from the pattern.

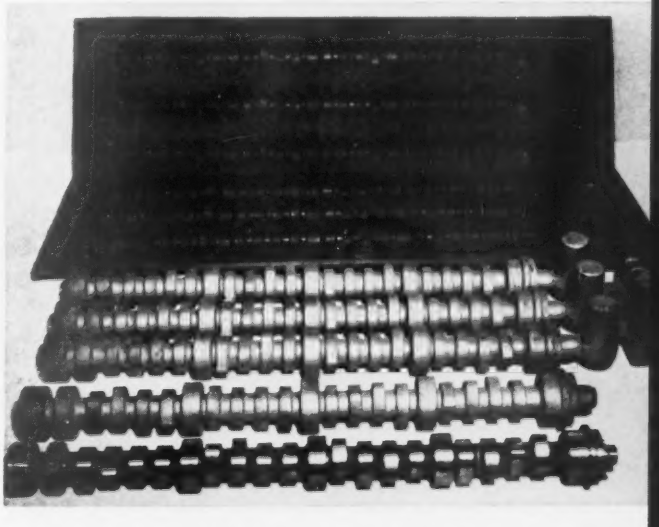
Equipment Details—Pattern plates are made of cast iron 1¼-in. thick. The pattern stool is bolted and doweled to the heater platen, which is bolted to the pattern table. Bolt holes in the heater platen are elongated for expansion under elevated operating temperatures. Guide pins between cope and drag patterns locate the blow and press heads with the pattern.

Blow heads and press heads are of aluminum, cast in dry sand. Blow holes in the blow head are ½-in. in diameter. They are located in positions away from pattern details to minimize pattern erosion. Production patterns after more than a hundred-thousand cycles have shown little or no wear on the areas under blow holes. A ratio of 50 blow holes to 60 vents per head has worked satisfactorily.

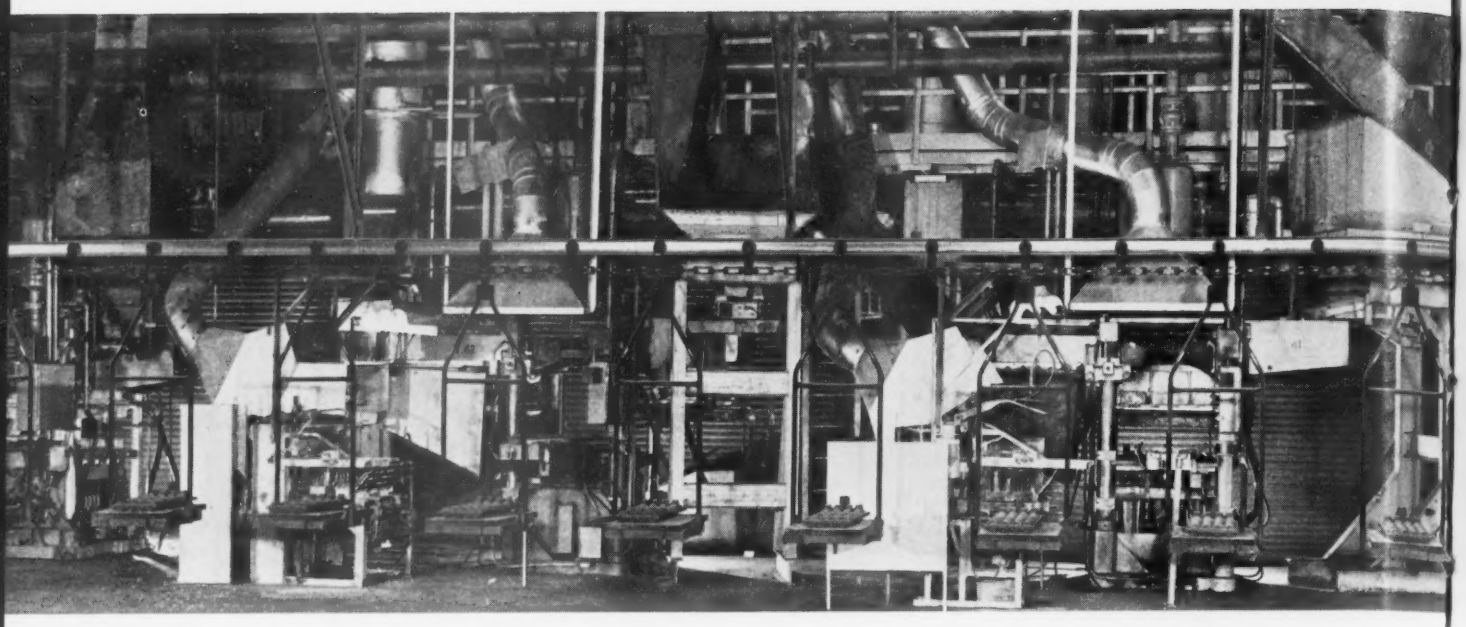
Thickness of each shell blown is controlled by a metal frame around each pattern. This frame also acts as a seal between the blow head and the pattern during the blowing operation.

Tubular heating elements are cast integrally with the pattern and press-head heater platens to provide a maximum heat transfer rate. Heater platens are rated at over 125 kva. Operating temperatures are maintained at 500-600°F by thermal switches mounted in the patterns and press heads. Units adjacent to the press heads and patterns are kept at 170°F by insulation and water cooling.

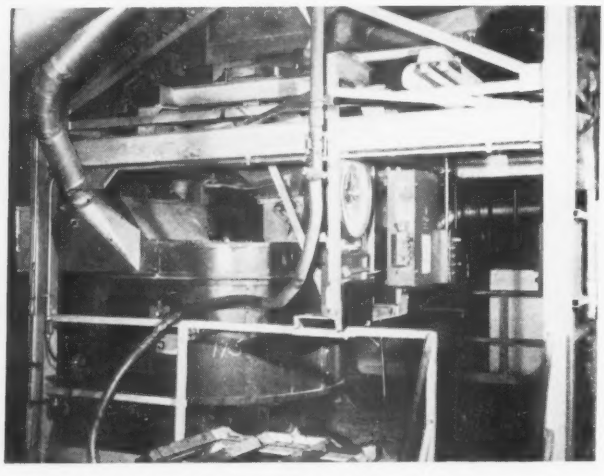
Machine movements during the molding cycle are powered by air or hydraulic cylinders controlled by auto-timed circuitry. The hydraulic system



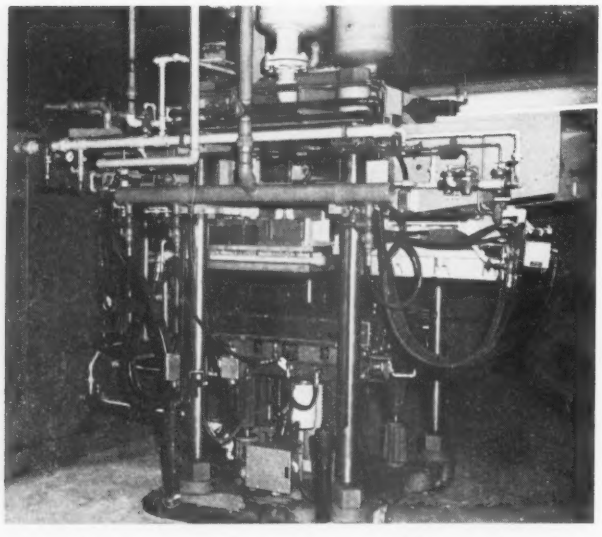
Empty shell molds weigh about 20-21 lb. Each camshaft takes about 50 lb of metal.



Blow-hot press line contains three machines and has more than doubled output of previous methods



Sands and resin are carried on vibrators to a weigh lorry unit for automatic batch weighing



Machine movements during the molding cycle are powered by air or hydraulic cylinders controlled by auto-timed circuitry and limit switches

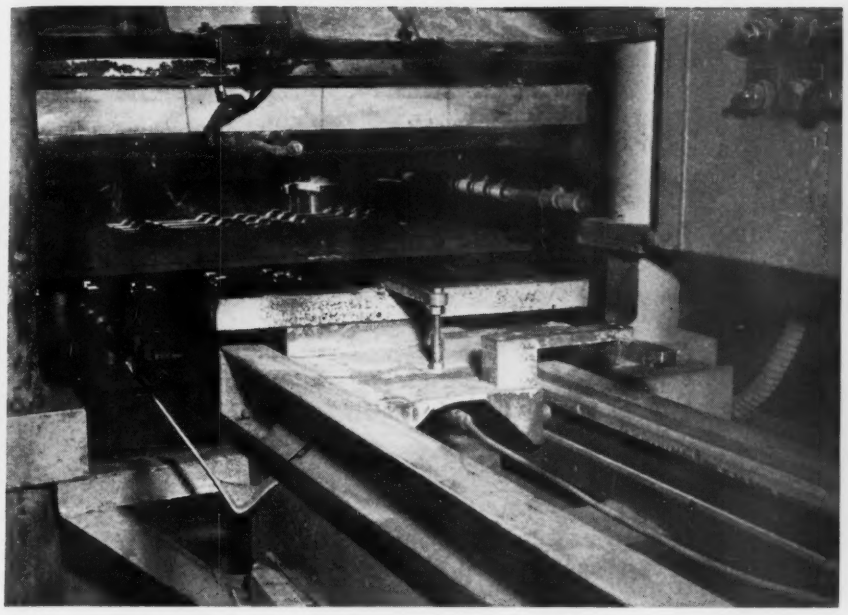
consists of an air-operated hydraulic booster and a hydraulic cylinder to provide 100-psi oil pressure for raising the pattern table for blowing and press curing. Air-motivated units are controlled through circuits of solenoid-operated valves, pilot-controlled valves and quick-opening and closing valves. Operating speed of the blow and press-head assemblies is controlled by regulating valves.

A separate electrical console controls the duration and sequence of operations. The molding cycle consists of 13 separate operations controlled by adjustable timers mounted on the door of the console. Operations are properly sequenced and governed by interlocks (both mechanical and electrical) in the console and on the machine. Limit switches control positioning of movable parts for each succeeding operation.

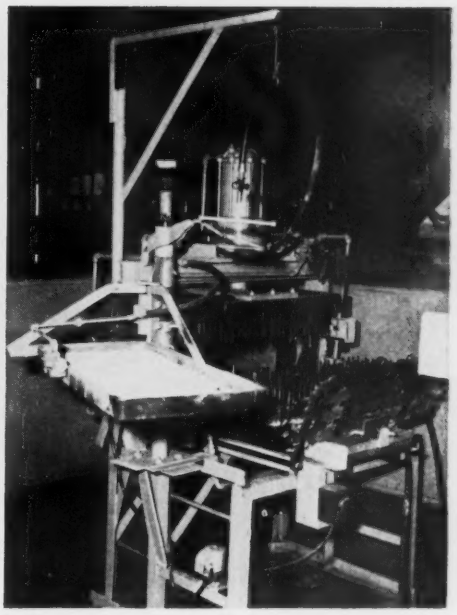
Operating Cycle—In production operation, the magazine moves under the sand-resin mix hopper, and the mix falls through a vibrator into the magazine. The amount of sand in the magazine is adjusted automatically by a depth gage. Magazine and blowhead move over the top of the pattern, and the pattern is elevated against the blowhead. Shell mix is then blown under 80-lb air pressure into the space between the contoured blow head and the pattern plate which is heated to about 500-550°F. The blow requires one second.

The pattern is lowered, and the press head (similar in contour to the blow head) moves on a roller carriage to the press-cure position. The pattern containing the uncured shell is elevated and pressed against the heated head for curing. A 300 psi pressure gives best results. Pressure is maintained for 25 seconds.

The pattern is lowered several inches and stopped by a limit switch. Stripper pins lift the cured shell from the pattern. Conveyor bars are inserted between pattern plate and shell, and a carrier picks



Cured shell mold half just prior to being picked up by mold carry-out carriage in the foreground



Shell halves are joined together on a squeeze-clamping fixture within easy reach of operator

up the shell from stripper pins. The pattern stool drops to its starting position as the shell is cleared, and the roller carriage containing the press head also returns to its starting position.

The operator removes the cope half of the shell from conveyor bars and places it face up in a squeeze-clamping fixture. He knocks off the top of the sprue and inserts a strainer core in the sprue. The shell is blown out with an air hose to remove any particles of dirt or other foreign material. A template designed to cover cavities in the cope, but provide openings on parting surfaces, is placed upon the cope. A box containing dry resin glue is swung over the template and vibrated. Resin falls through openings in the box that align with openings on the template to control positioning of the resin on parting surfaces of the cope.

The resin box is swung aside, the template removed and the shell visually inspected to see if the desired pattern is complete. The operator places drag half on the cope and actuates two buttons. Air cylinders move the mold halves together, and they are squeezed under spring tension for 24 seconds. The mold drops and slides from the fixture toward the operator, is visually inspected and is placed horizontally upon a pendulum conveyor platform for movement to the pouring station.

Melting and Pouring—Metal for the shell mold line is taken from cupolas melting iron for the other lines in the foundry operation. Metal is transported by a 3-ton transfer ladle from the cupolas to an electric holding furnace of 3-ton capacity. Metal is tapped from the cupola at about 2710°F and poured into the shells at about 2600-2660°F.

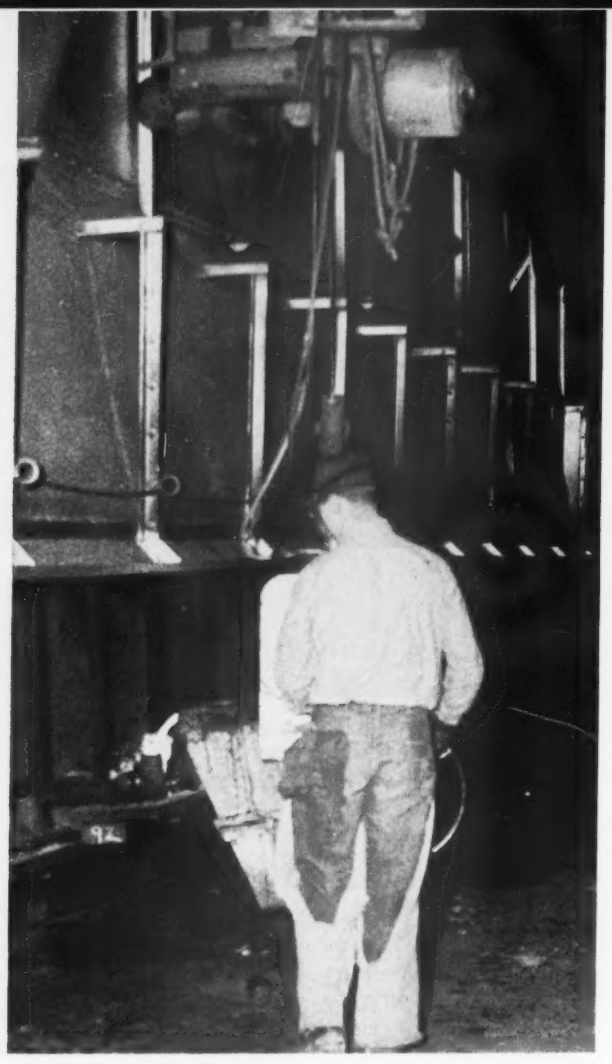
Composition of metal for camshafts is 3.2-3.4 C, 2.25-2.5 Si, 0.75-0.85 Mn, 0.27-0.30 Ni, 0.45-0.50 Mo and 0.90-1.05 Cr. Brinell hardness ranges from 365-390. The chill is adjusted to meet Brinell specifications.

Castings are poured horizontally. Pouring ladles are mechanized to travel at the same rate of speed as the pendulum mold conveyor. Shell molds weigh approximately 20-21 lb each. Due to differences in the shape of the three camshafts, the amount of metal required for each one varies, but the average is around 50 lb. Approximately 8-10 lb of metal is used for the bob and sprue, the remainder being the weight of the casting.

After pouring, shells are conveyed through a cooling hood and across an automatic shakeout mechanism which transfers the cams from the pouring conveyor to the cooling conveyor. Castings remain on the pouring conveyor about 28 minutes before shakeout and transfer to the cooling conveyor. The cooling conveyor moves the cams to an outside cooling court where they make three parallel runs. They re-enter the building one hour later and move through the sand blast unit.

Cleaning Operations — The specially designed blast cabinet directs abrasive at low pressure over the entire surface of the casting, removes little or no parent metal and leaves no pit marks on the surfaces. Blast pressure is low enough to prevent warping and distortion of the long slender cams. The cabinet contains four blower units to direct air in a pattern desired for the shape of the cams. Blower units are staggered up and down, two on each side. One unit cleans the top half and a second unit cleans the bottom half of one side. The other units act similarly to clean the other side of the casting.

Full use of the abrasive is provided by curved corrugated baffle plates at each blower unit. The nozzle opening ranges from circular to rectangular, and the blast direction can be adjusted to any angle from horizontal to vertical to clean work of



Castings are poured horizontally from ladles mechanized to travel at same speed as the conveyor

almost any shape likely to be encountered.

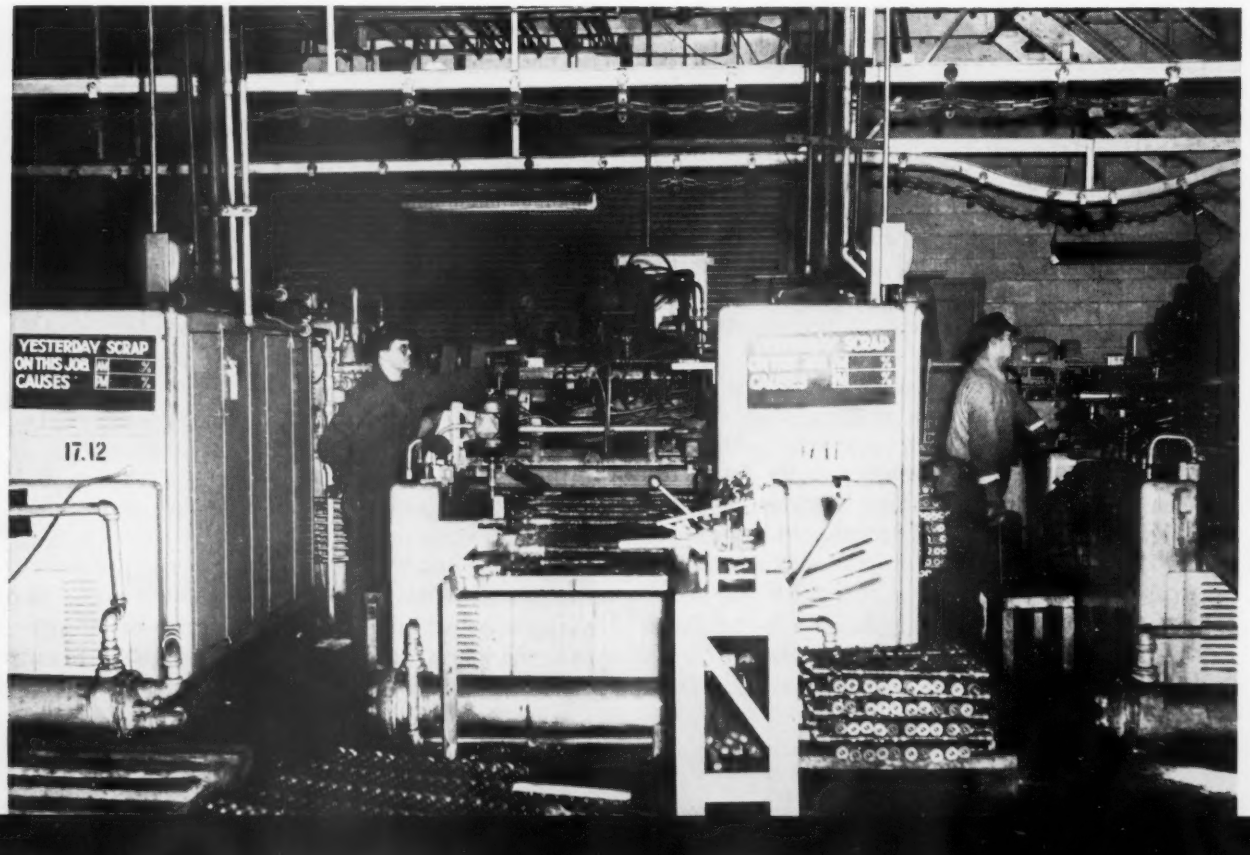
Following sand blasting, cams are lifted off the conveyor manually, debobbed and hooked onto a processing conveyor. If fins are present, they are ground off as they pass a grinding machine. A battery of mill and centering machines mills ends flush, center drills the cams and checks each unit for dimensional accuracy. Cams again are placed on process conveyor hooks for movement to one of several flame hardening machines for hardening and quenching in oil. Upon removal from the oil quench, the cams are checked in a straightening fixture, inspected and palletized for shipment.

Production Doubled—As used at Defiance, the blow-hot press machine has increased camshaft production more than 100 per cent over methods used previously. As production experience is gained with this new machine, engineering improvements are constantly being incorporated into its design.

The machine already has provided several manufacturing advantages. Its rapid cycle of one to three seconds for the blow and 12 to 25 seconds for the cure, depending upon the casting involved, increases unit output. Dimensional quality has been improved through reduction of warpage because during pouring operations molds are supported on leveling pads blown as an integral part of the drag. Thinner shells which reduce resin costs are made possible by the control of shell thickness, blowing and hot pressing.

Continuing experiments by Research Staff and Central Foundry engineers are going on with this new technique to speed its operation to 70-100 complete shell molds per hour. Changes in the sand-resin mix and addition of other mechanical elements in the cycle need perfecting to handle a further increase in production.

Camshafts are flame hardened, quenched in oil, straightened and inspected before palletizing



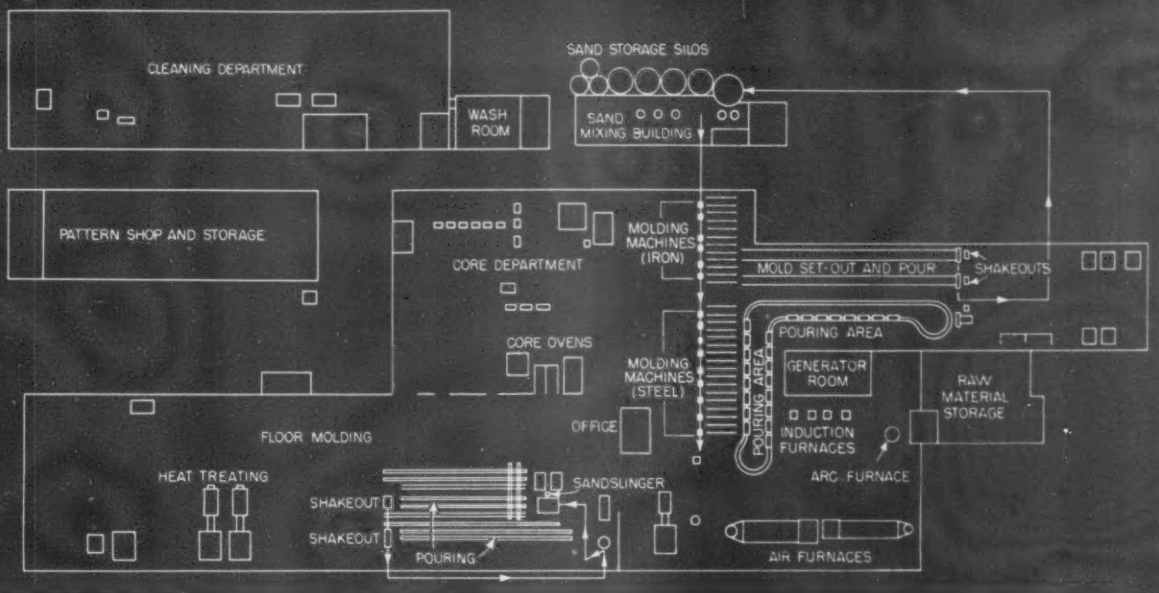


Fig. 1—Foundry plan showing general location of departments and equipment

Sand Control

Important in Production of

Chemical Castings

Accurate control of molding sand properties is found to be essential in the production of high-silicon iron and alloy steel chemical castings

By EDWIN BREMER
Metallurgical Editor

FOR NEARLY 45 years, the Duriron Co. Inc., Dayton, O., has produced a wide variety of high-silicon iron castings for the chemical industry. These castings range in weight from less than an ounce up to 6500 lb. They include bell and spigot pipe and fittings, valves, centrifugal and piston pumps and parts, kettles and numerous special castings employed in the production of chemicals. In addition, the firm operates a steel foundry in which high-alloy steel castings for corrosion and heat resistant applications are produced.

Iron is melted in two air or reverberatory-type furnaces operated on a staggered schedule for two-shift operation in the foundry. One furnace has a capacity of 35 tons, and the other holds 20 tons. The large furnace is charged in the afternoon, and the heat is ready to be poured at 6:30 the following morning. The smaller one is charged at midnight, and the heat is ready for tapping between 9 and 10 a.m.

Molding Facilities—Molds are made by hand and on machines. Small iron castings are made on squeezer-type molding machines arranged in a line in one section of the foundry as indicated at right of center in the accompanying floor plan. Molds are set out on pallets holding four molds. Pallets are placed on low-wheeled cars with an 8-ft span which travel along two sets of rails about 125 ft long. Molds are poured and after a cooling period are moved to vibrating-grid shakeout units. Flasks are returned to the molding machines. Sand is conveyed outside the building by an underground belt, elevated into a storage bin in the upper part of an adjacent building and reconditioned for further use.

Large castings are made by hand in an area adjacent to that occupied by the machines. Bell and spigot pipe in a wide range of diameters is made in another area of the foundry with a stationary, rotating-head type sandslinger. The sandslinger is operated with two patterns to form drag and cope molds, one on each side of the machine, as de-

picted in Fig. 2. The drag mold is rammed first, picked up by a hoist, rolled over and placed on a mechanically operated mold conveyor 75 ft long. Cores then are set, and by that time the cope has been rammed. It is lifted off the pattern and placed on the drag. The completed mold is clamped, moved down the conveyor and poured.

After cooling, the mold moves on to a vibrating-grid shakeout. Flasks are returned to the sand-slinger station on a roller conveyor. Pipe castings are picked up, placed on cars, subjected to a heat treating operation to relieve any stresses and given abrasive blasting, snagging and other finish-cleaning operations.

Sand Handling—Sand from the shakeout travels on an underground belt outside the building, where it is discharged onto a sloping belt 90 ft long which transports it back to the sand preparation department, adjacent to the sandslinger station. Near the preparation department, the sand is discharged onto a coarse-meshed rotary screen 20 ft long which removes core butts and foreign matter. It then empties onto a similar screen of smaller mesh, located beneath the first. Sand from the second screen is discharged onto a short conveyor belt and carried into the boot of a bucket elevator which transports it into an elevated, 80-ton capacity storage bin, where it is permitted to cool.

From this bin, cooled sand is transferred to an adjoining bin over the sand muller. Discharge of the shakeout sand into the cooling hopper or bin and transfer of the cooled sand into the storage bin above the sand muller are accomplished automatically by an interlocking switch arrangement indicated schematically in Fig. 3.

A spring switch located about 1 in. above the

Fig. 2—Bell and spigot pipe made on the sand-slinger are placed on a mechanical conveyor

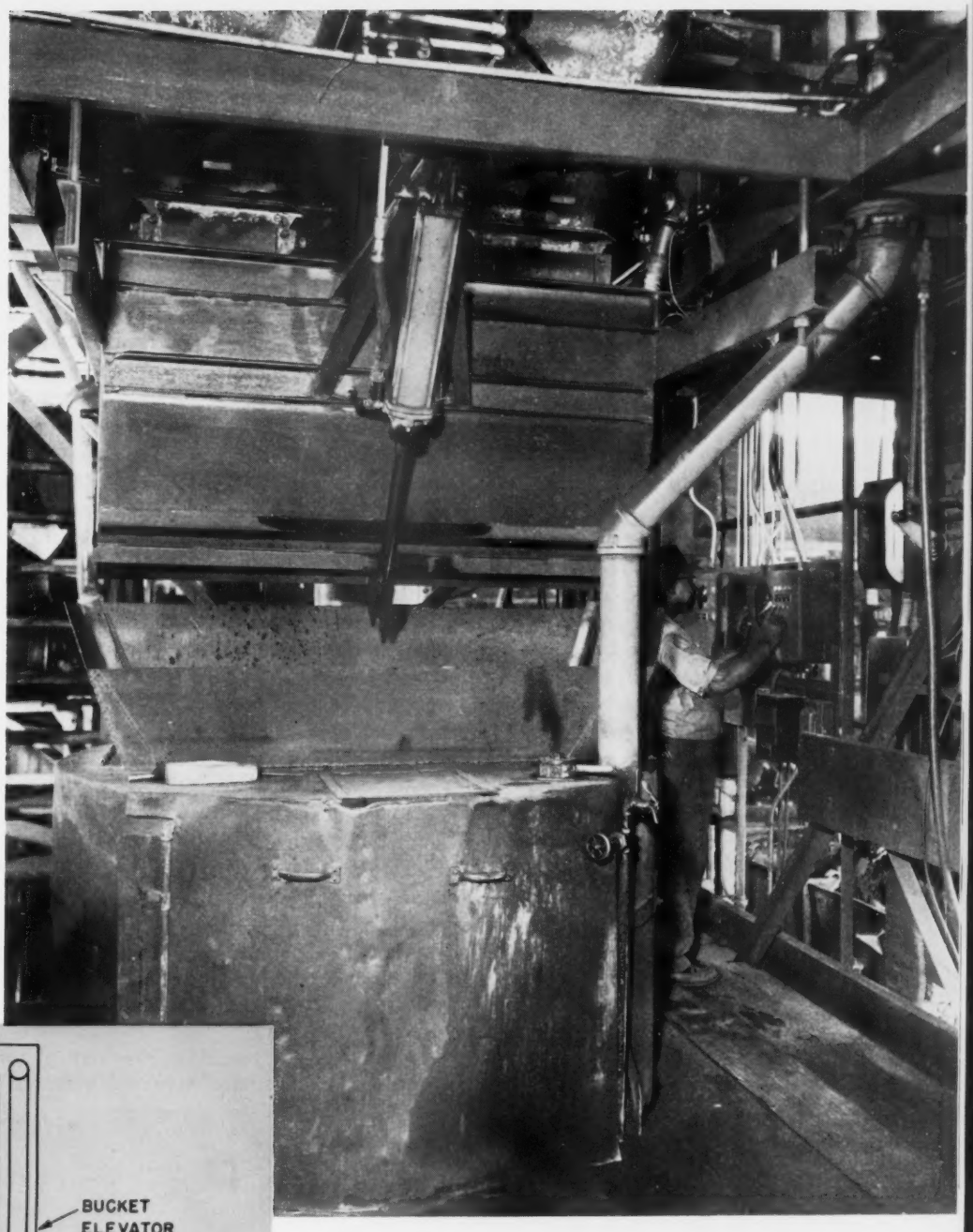
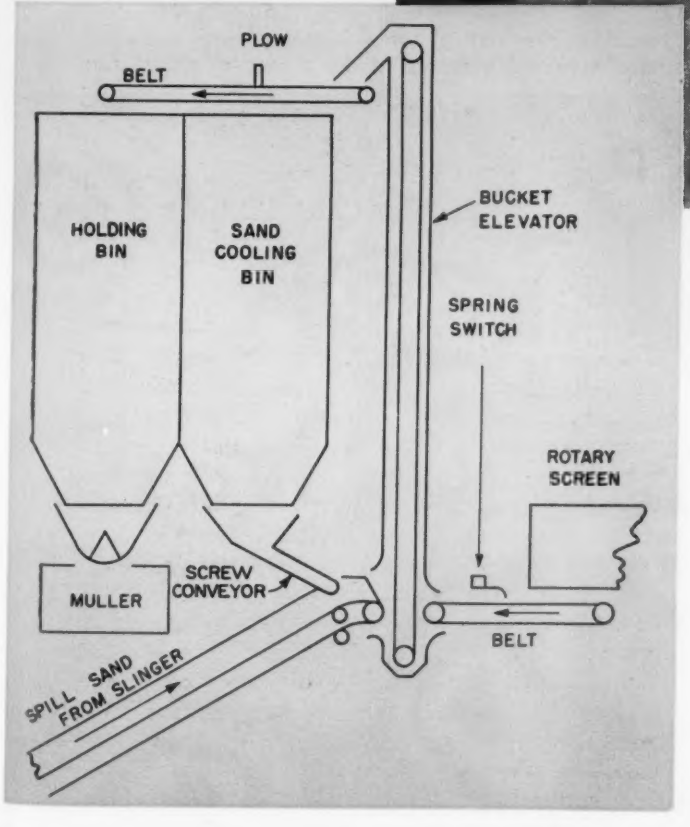


Fig. 3—Muller and measuring hopper in foreground. Control panel is in right background

Fig. 4—The sketch shows the arrangement of the equipment for transferring of sand from bin



conveyor belt which carries shakeout sand from the rotary screen to the elevator boot is interconnected with two other switches. One operates a screw conveyor at the bottom of the sand-cooling bin, and the other controls a plow on top of the bin. When sand is on the conveyor belt, the spring switch is held in a raised position, which permits only the plow to drop and to discharge sand into the bin. When no shakeout sand is on the conveyor belt, the spring switch falls to a lowered position which simultaneously places the screw conveyor in operation. It discharges the sand into the elevator boot and raises the plow on top of the sand-cooling bin so that the sand is carried across, into the storage bin above the muller. As soon as shakeout sand again arrives on the conveyor belt, the spring switch moves to the raised position, shutting off the screw conveyor and drop-

ping the plow over the sand-cooling bin.

Sand Preparation—Sand condition is an important consideration in the production of high-silicon iron castings because of characteristic high contraction and fragility or tenderness at red heat. To accommodate those conditions, the sand must have sufficient strength to resist cutting or washing by the flowing hot metal stream, maintain its form or shape until the metal begins to solidify and then collapse or lose sufficient rigidity so that the casting may contract freely.

Since sand condition is such an important phase in the production of these castings, the firm installed an automatic system developed by Hartley Controls Corp., Neenah, Wis., to control additions of moisture, bentonite and cereal to the shakeout sand to prepare it for re-use. Views of some of the equipment and its arrangement are shown in Figs. 4, 5 and 6.

The control panel in the right background in Fig. 4 contains a cycling or timing instrument which can be preset for any desired timing to feed batches of sand into the muller, add binders and moisture, mix the sand and discharge prepared sand. In combination with that instrument is another which electrically correlates moisture and temperature of the practically dry sand so that the correct addition of water may be made to bring the moisture to the desired point. The moisture and temperature sensing units (two of each, spaced alternately about a foot apart) are mounted inside the 1500-lb batch-measuring hopper, which is interposed between the bottom of the sand bin and the muller shown in the foreground of Fig. 4.

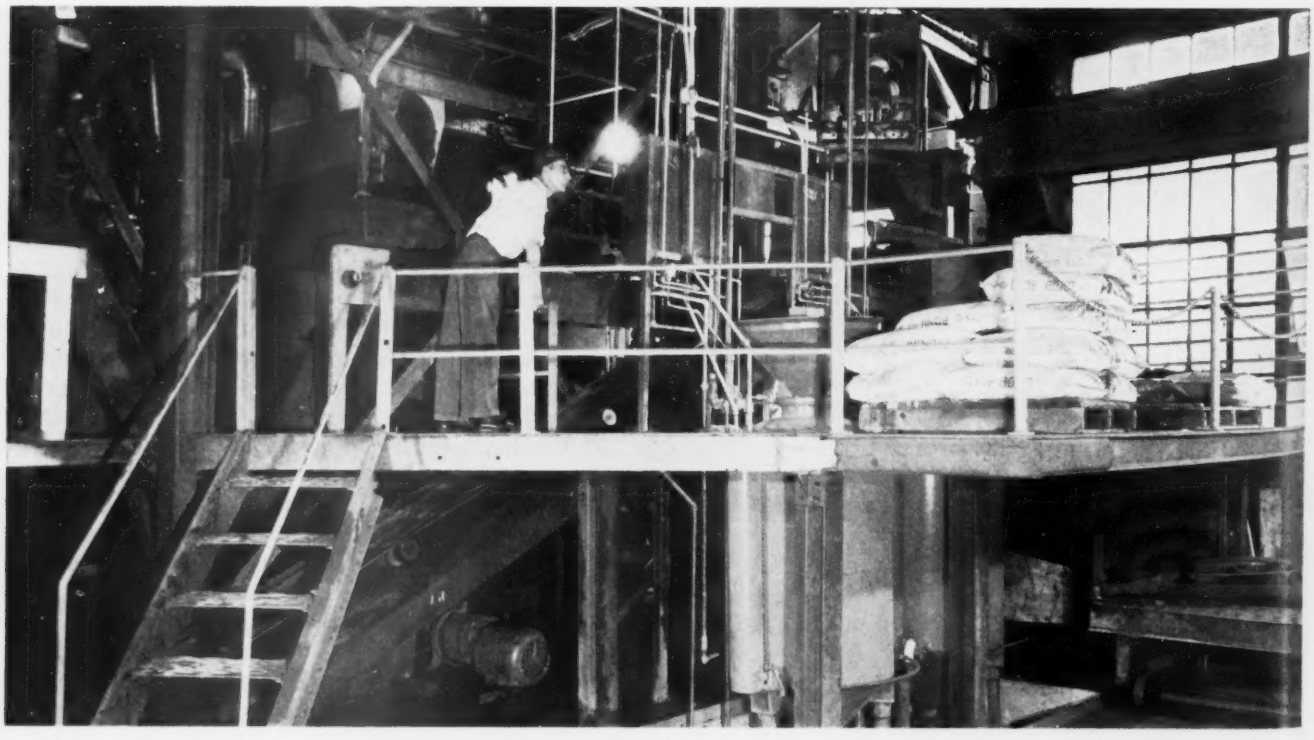
Sand reconditioning is accomplished in a two-minute cycle. Time is divided equally between making additions to the sand and mixing it. Additions to a 1500-lb batch of sand are 30 oz bentonite, 12 oz cereal, 3¾ gal water and 1 qt fuel oil. Bentonite and cereal are contained in cylindrical steel tanks at ground level, as shown in the center of Fig. 5, and are transported pneumatically into the muller.

Prepared sand is discharged onto either of two conveyor belts. One elevates the sand into a 15-ton hopper, shown at the left in Fig. 6. From the hopper, the sand is conveyed by a sloping belt into the hopper of the sandslinger at the far right. The other belt, shown just at the upper right of the hopper, discharges prepared sand into containers which are transported by crane to the hand molding floors on the other side of the slinger unit.

Sand for molding machines is prepared in a separate, adjacent building, as shown in the upper center of Fig. 1. Facing and core sands also are prepared there. Sand from the shakeout units on both the iron and the steel casting lines is conveyed by belt to a 50-ton storage bin at one end of the building. From the bin, the sand is discharged into either of two mullers through measuring hoppers. The hoppers contain single temperature and moisture sensing units similar to those mentioned earlier for automatically determining the moisture addition, but additions of bond, etc., are made by hand.

Sand is discharged onto a short belt and from it into the boot of an elevator. This elevator empties the sand onto a conveyor belt about 100 ft long which extends over the line of molding machine hoppers. Manually operated plows distribute the sand into the hoppers as required. Facing and

Fig. 5—Bentonite and cereal in the vertical tanks in center are conveyed pneumatically in accurately measured amounts to the muller at upper left



core sands are prepared in any of three other mullers in the building and are discharged into containers which are transported by lift truck to the desired locations.

Steel Foundry—Steel is melted in a 1-ton capacity, direct-arc electric furnace and in two 850-lb and two 1000-lb capacity, high-frequency electric furnaces. Machine-made molds are set on an L-shaped car-type conveyor. After pouring, the castings are shaken out onto a vibrating grid unit. Castings are rough cleaned in an area behind the shakeout, then transported in containers to the finish-cleaning department, which is housed in a separate building, shown at the upper left in Fig. 1. There the castings are subjected to snagging and grinding operations and heat treatment. After heat treatment, castings are abrasive blasted and inspected.

Castings which must be pressure resistant, such as valve bodies, are tested in this department by being subjected to air pressure after their exteriors have been painted with soap solution. Any leakage, however small, is revealed by the presence of soap bubbles. Minor leaks are repaired by welding, and the castings again are subjected to test to insure that leaks have been eliminated.

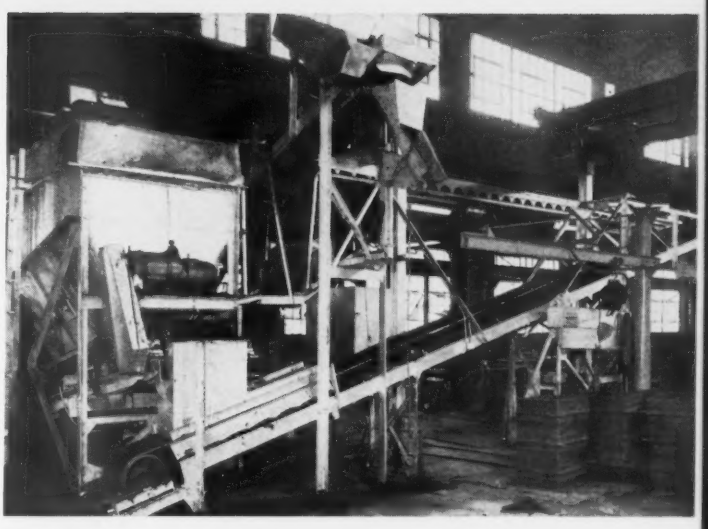
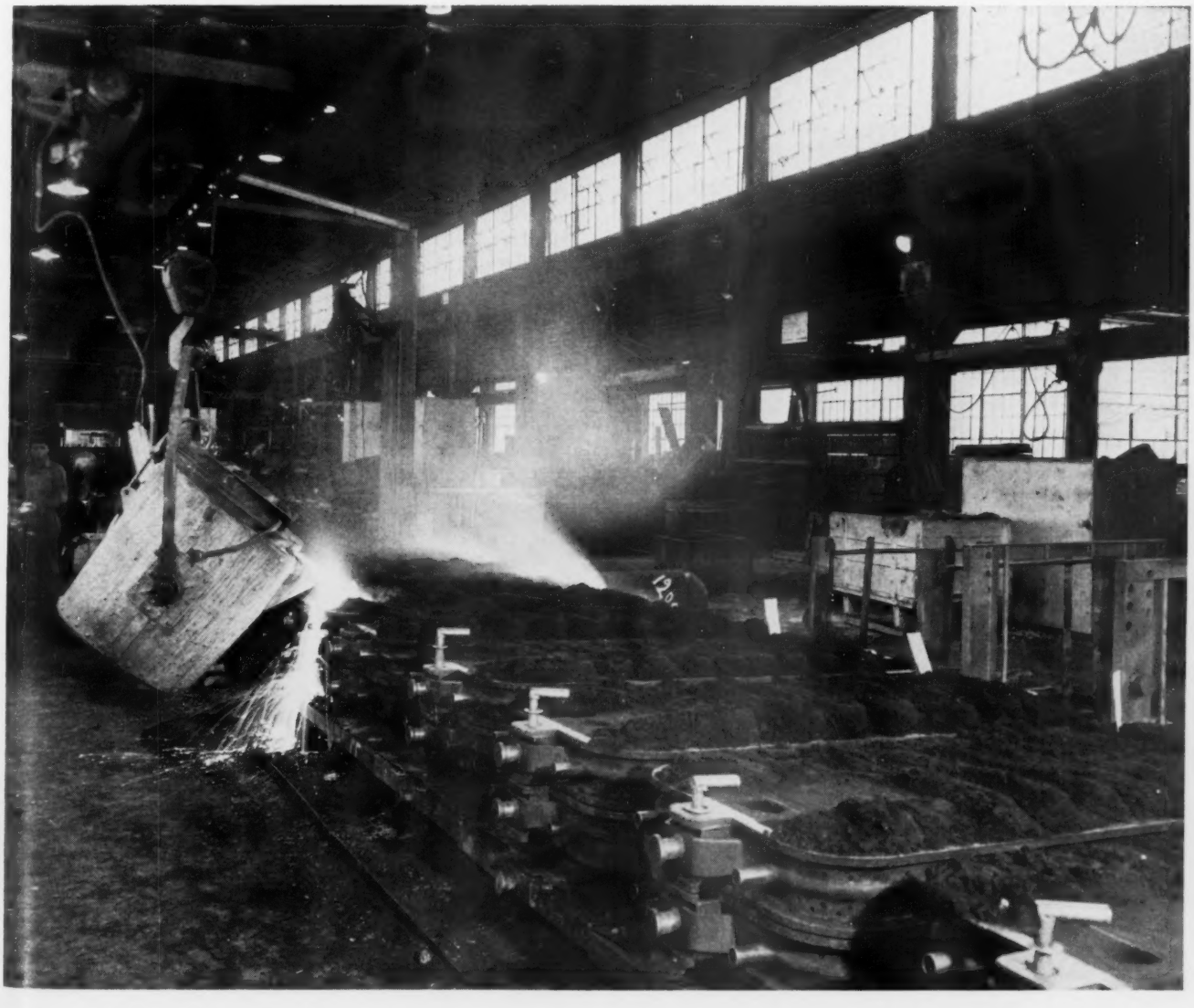


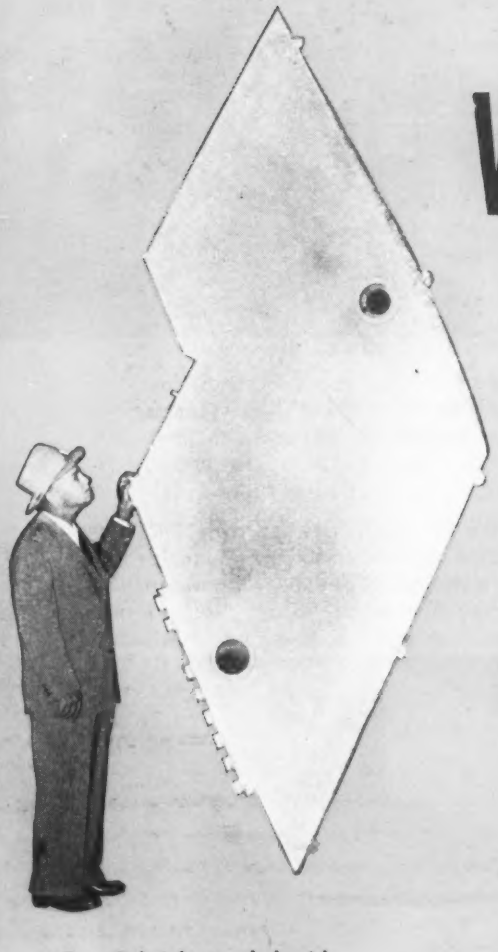
Fig. 6—Prepared sand in bin feeds to sandslinger via inclined belt. Belt and chute, upper center, empty sand into boxes to be forwarded to floors

Fig. 7—Part of the foundry is devoted to making bell and spigot pipe by hand ramming. The molds are filled with metal at a definite temperature



MAGNESIUM WING SECTIONS

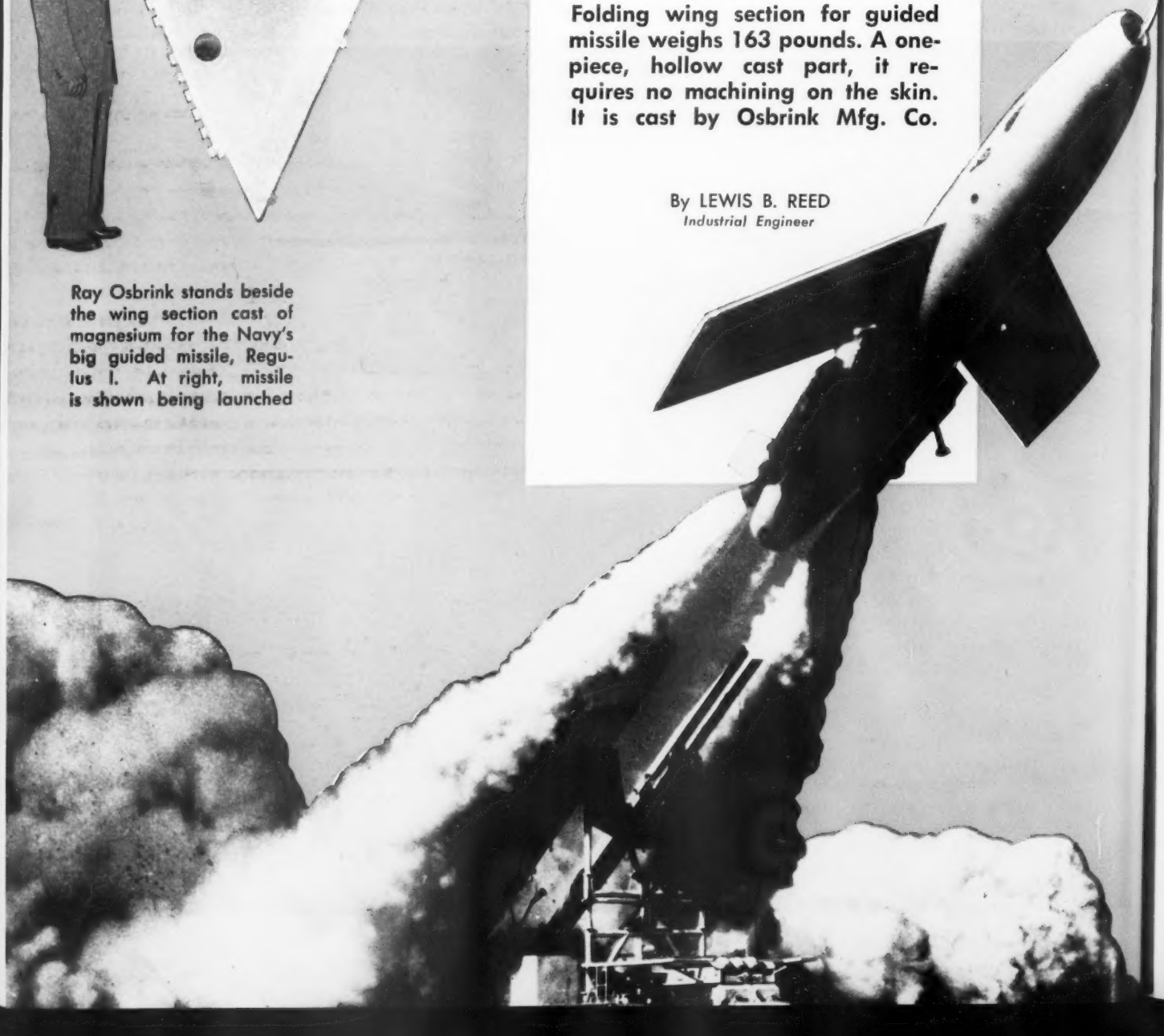
Cast on Production Basis



Ray Osbrink stands beside the wing section cast of magnesium for the Navy's big guided missile, Regulus I. At right, missile is shown being launched

Folding wing section for guided missile weighs 163 pounds. A one-piece, hollow cast part, it requires no machining on the skin. It is cast by Osbrink Mfg. Co.

By LEWIS B. REED
Industrial Engineer



IT'S a rare occasion when an old-time Navy inspector becomes impressed by a metalworking operation. That is why the few spectators in the experimental foundry at Osbrink Mfg. Co., Los Angeles—knowing the inspector had already seen the operation several times—were surprised when he told them, "You're seeing history being made."

They were watching the pouring of a cast magnesium wing section for Chance Vought Aircraft's Regulus I.

The Regulus I is a big guided missile, and its size makes transportation and stowage difficult. For this reason it is provided with folding wings, and the casting being poured in this instance was the section of the wing which folds.

Every foundryman has been able to demonstrate the advantages of casting a part which is better and cheaper than a similar fabricated one. But foundrymen and aircraft structural engineers call Osbrink's casting a work of art. The aircraft industry is amazed that a wing section can be poured which is lighter and stronger than a similar fabricated one.

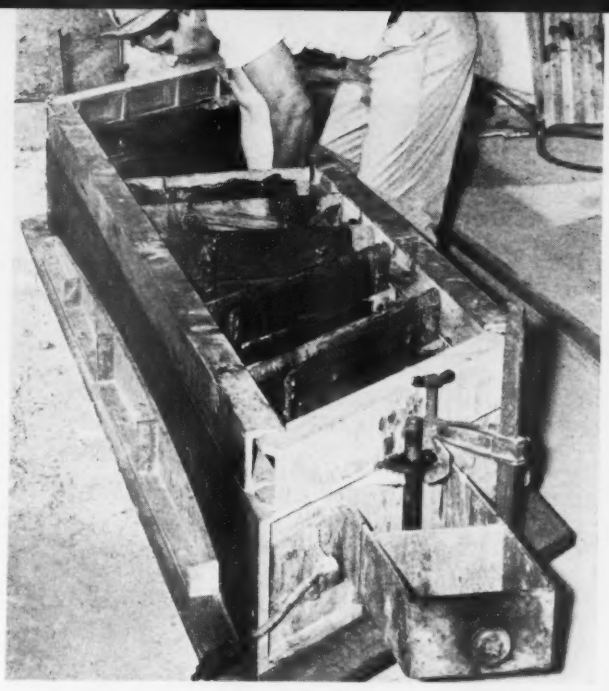
Many unusual castings have been made, but they usually were "one-shot" operations. This wing casting is now a routine job, carried out in a jobbing foundry and run in accordance with production schedules set up by Chance Vought and the Navy. Production figures cannot be released. Numerous features presented in this article are protected by U. S. patents, issued and pending.

Casting Dimensions—The casting is 11 ft at its longest dimension diagonally from corner to corner; 7 in. thick at the thickest point; planform area is 28.3 sq ft; metal is Dow H; weight is 163.3 lb. The one casting includes top and bottom skin, all ribs, hinges and wing tip. Complicating the casting of the wing is the fact that the thick hinge section adjoins the skin, which tapers from 0.250-in. at the hinge section to 0.180-in. at the wing tip.

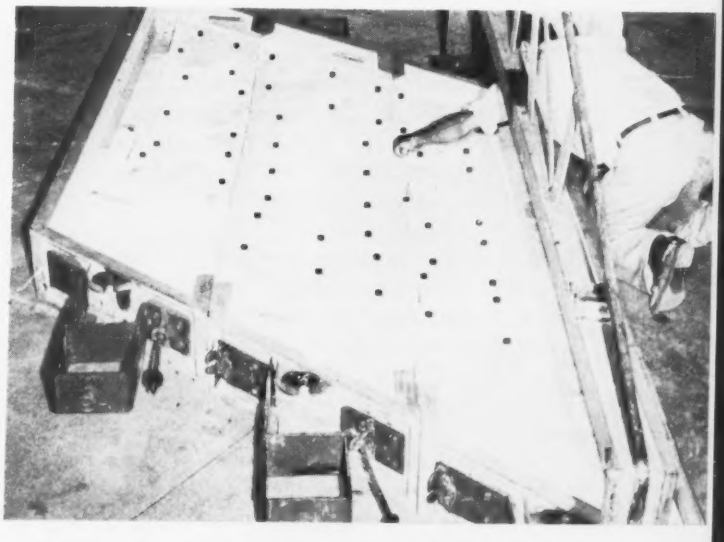
As typical of castings made by the Osbrink process, the exacting dimensions are held rigidly for each casting. Surfaces are extremely smooth and are installed on the missiles without machining on airfoil surfaces. The thin-walled cross-sections have proved in static tests to be much stronger than the designed load.

To hold the dimensions, as is necessary when casting a wing which is flown at high speed, every step of the operation, from the placing of the flasks on the floor to the pouring of the mold, is done with exacting precision. The foundry starts its precision operations at ground level, for the molds are made on a smoothly ground concrete surface plate. Flasks are indexed to come together exactly the same every time, and are checked frequently for dimensional stability. In fact, every step in the operations is checked and double checked.

To obtain desired shrinkage in a casting of this size without tearing the grain structure in the process of shrinking, it was advisable to have as few risers as possible. Large fillets also were eliminated; the radius of those used is 1/64-in. Risers are needed only at the hinge section, where



Tucking sand around pattern in a cope section. The mold is rammed in three separate sections



Three sections of the drag flask being fitted together for checking before setting the cores

Setting of cores must be checked carefully to assure accuracy in thickness of the wing skin

After cores are set, a fixture is used to check their proper alignment in the mold

This side of one mold section will butt against similar face of another section

they feed the heaviest mass of metal.

Hinge Section Critical Area—By careful analysis of the structural elements needed in the wing, it was designed with only the hinge section, representing about 20 per cent of the entire wing area, as a critical section.

The wing was designed to make the entire mold in three separate sections. Thus the foundry was able to place the cores forming the wing interior into each separate mold unit, meanwhile inspecting the wall thickness created by these cores to see that no crush occurred during the closing of the cope with the drag. The final operation is to clamp the flask sections together on the concrete surface plate.

The smooth surfaces obtained are the result of many years of experiments with different sand mixtures. Facing sand is tucked gently into the detail so that no ram-off will occur; in fact, ramming of the entire mold is done carefully. The metal is poured at the lowest possible temperature to insure rapid solidification and desired grain size and physical properties.

Although the wings were designed to use current strength-of-material data, static tests proved them to be considerably above the average 150 per cent design load factor. In some cases it was 250 per cent higher.

No Machining Allowance—The foundry ordinarily specifies thin walls of minimum draft and small fillets, without the usual allowance for machining (see "Sand Castings Can Be Made To Close Tolerances," FOUNDRY, January, 1954, page 92). Ray Osbrink states the reason this way:

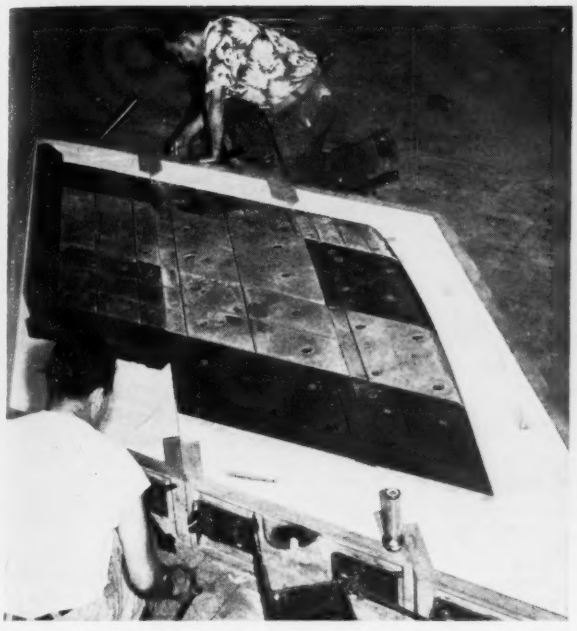
"There are varying differences of grain size in relation to dimensional cross-sections. A 1-in. test bar has a coarse grain, whereas a ⅛-in. test bar has a dense grain. This reduction of grain size with decrease in test bar diameter follows a definite relationship. Consequently, the more rapid the solidification, the denser the grain. This is an added reason why dimensionally accurate castings are preferable. A conventional casting with its usual 0.090-in. finish stock added to all machine surfaces creates a wall thickness larger by reason of the excess material added. Therefore, the coarse grain left after machining has less strength than when the part is cast true to size without excess material."

Since the cast wing static tests were made, Chance Vought's metallurgical department has made tests to develop this theory, and a report approved by the Navy was submitted to the Aeronautical Industries Association, with a new series of values giving a sliding scale of physical properties which are graduated as to both metal thickness and alloy.

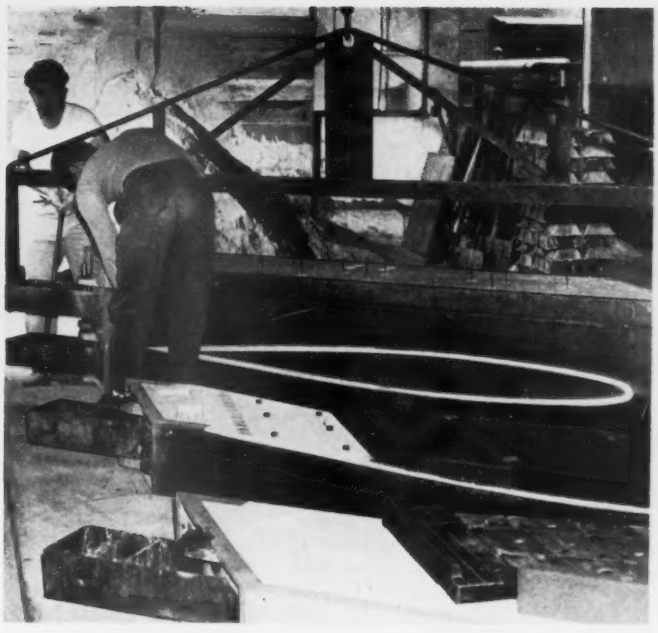
Trained Aircraft Engineers—It is easy to see that the project took a lot of co-operation to determine a design suitable for casting and also for acceptance of the castings. The groundwork for such co-operation was laid by Osbrink several years ago when the company started employing engineers with an aircraft background. These engineers now are well trained in foundry methods and are qualified to redesign or help to redesign cast parts to replace fabricated aircraft parts. They know aircraft engineers' problems and speak the same language.

Since heat treating could be a bottleneck with volume production, it was decided, as a co-operative agreement, to use Dow magnesium H alloy in the stabilized condition, or T-2 rather than HTA or T-6. The foundry was to guarantee a minimum 12,600-psi yield strength with 3-per-cent elongation, and further stipulated heat treating at no further cost if the wing failed in static test.

Each wing passes a radiographic inspection and a thorough check of dimensions and contours before it is shipped.



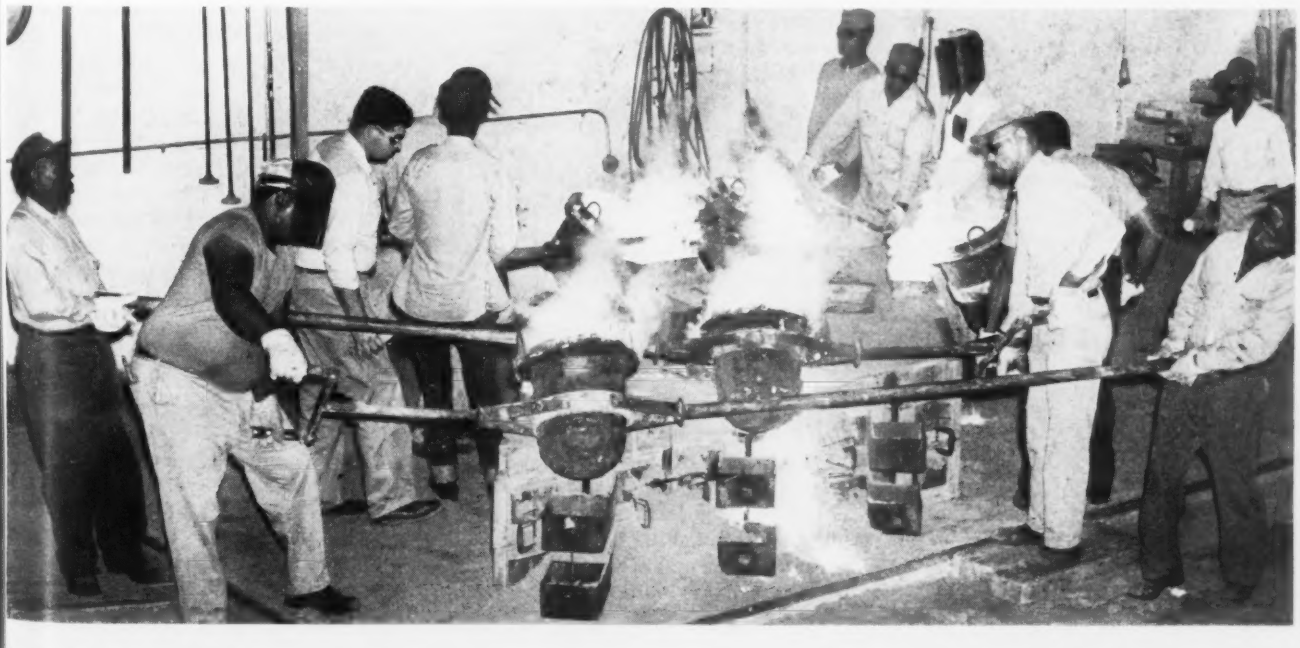
Three sections of the drag flask are being clamped together after cores have been set



Lowering the cope of one mold section. Outline of core gives idea of wing cross section

Mold is smoked by acetylene torch to help provide a smooth surface

Pouring a mold from five ladles. Gating system permits mold to fill quickly



Questions and Answers

Shrinkage occurring in valve seat results in leakage . . . Discusses procedures for reducing carbon in stainless steel scrap melted in an induction furnace . . . CO_2 treated cores do not collapse . . . Making chromium-copper castings . . . Molding methods

Porosity Results in Leakage

QUESTION Part of our production is valves which we have made without much difficulty for some time, but recently we ran into a number of leakers due to porosity. We cut one up and it showed a defective streak as in the piece sent for your inspection. We are using 85-5-5-5 ingot.

ANSWER The streak you mention is a shrink, and may be caused by pouring at too high a temperature or lack of feed complicated by pressure of gas. Pouring range of the 85-5-5-5 alloy is 1950 to 2250° F depending on section thickness. Most suitable range is determined by experiment.

It may be that the gating system is not as good as it might be, in that the gates are a little too small, and from time to time trouble was encountered from cold shuts. To avoid that condition the metal temperature was increased with a tendency to go too high. High melting temperatures also cause increased gas absorption. We suggest that you experiment by increasing the gate size slightly and see what happens with lower pouring temperatures. Then appropriate changes can be made.

Reducing Carbon in Stainless

QUESTION Is it possible to reduce the carbon content of stainless steel in the high-frequency induction furnace? Our reason for asking is that we have a supply of No. 347 stainless steel scrap on hand which contains 0.10 to 0.15 per cent C or considerably over the 0.08 per cent C limitation, and if possible would like to melt it down in our small (150 or 300-lb) high-frequency units which have magnesia linings. If it can be accomplished what would be the effect on Cr, Cb and other elements?

ANSWER Presumably your stock of the high-carbon 347 stainless is much larger than could be handled by adding it in small quantities to charges composed mainly of new material such as ingot iron, low-carbon ferrochromium, metallic nickel, etc. which would enable you to bring the carbon within the desired range.

If that is the case, the best procedure would be to melt the steel and raise it to a temperature of 3150° F or above and blow with oxygen. The hotter the bath when oxygen is used, the better, since it minimizes loss of Cr. Some will be lost, of course, as well as much of the Si, Mn, and perhaps all of the Cb.

Since there is no exact information on blowing small heats of steel, especially in the induction furnace, you will have to do some experimenting to find out how much oxygen will be required to accomplish the desired reduction in carbon, as well as to determine the losses in order elements.

It seems to be reasonably well established that rate of carbon removal with oxygen decreases as the carbon decreases, and you will find that dropping the carbon from 0.15 to 0.06 or 0.07 per cent will require much more oxygen than decreasing it from 0.25 to 0.16 per cent.

Sand Condition Causes Defect

QUESTION Sometimes in white iron castings which we make in our foundry in Mexico we find a spongy effect from ⅛ to ¼ in. in depth in some areas. Can you suggest the possible cause, and suggest a remedy for that condition?

ANSWER Supplying a definite answer on the possible cause, and remedy for the spongy or porous areas is rather difficult without a specimen to examine. We only can hazard a guess as to the cause and suspect that the trouble lies in the sand condition. It may be caused by excess moisture in the sand, or by presence of clay or sand balls resulting from improper mixing or high clay content.

Again tramp iron, wood or other foreign material may be in the sand. Hot iron coming in contact with those materials generates gases which spurt into the metal. Uneven ramming, causing some parts of the mold to be too hard, is another possibility.

Undoubtedly none of these possibilities is severe enough to result in blows, but it does prevent the metal from lying quietly against the mold face, causing a slight agitation or fluttering until solidification occurs. Careful examination of the possible causes mentioned should reveal the most likely trouble source or sources and correction can be made when that has been ascertained.

Has Trouble With CO_2 Process

QUESTION For the past several months we have regularly been making cores in our foundry in India by following the procedure as described by Arnold Tipper in the June, 1955 issue of FOUNDRY. So far we have been able to make only simple cylindrical cores. We have not been able to make cores with thin projections and intricate cavities by the process. We also find that the cores do not collapse. It is not possible for us to import proprietary silicate binder, and will appreciate additions to the sand mix which will increase collapsibility and enable us to make intricate cores. We are using a sand mix with 4 per cent sodium silicate of local make, 0.5 per cent cereal binder and 0.75 per cent coal dust. After gassing, the cores show a compression strength of 70 to 90 psi. We have tried increasing the amount of coal dust and cereal to improve collapsibility without any success. Can you suggest any additions which may be obtained locally which would help?

ANSWER To obtain suitable collapsibility of cores made with silicate binders it is necessary to add sufficient organic material. The proprietary binding materials on the market are not straight sodium silicate but contain additives.

Possibly you did not increase the amounts of cereal and seacoal sufficiently to improve collapsibility. It may be that raising the seacoal addition to about 6 per cent would permit you to remove the cores more easily. Or the addition to the sodium silicate of about 20 per cent raw invert sugar containing around 60 per cent solids might be the answer.

Possibly part of your difficulty in not being able to make cores with thin projections or intricate cavities might be due to two causes. One is that the coreboxes contain dents or other mars on the surfaces which prevent extraction. Again, the trouble may arise from lack of proper gassing with CO_2. Try placing some small vents at the outside edges of the thin projections or the pockets of the intricate cores so that the gas

penetrates completely through the section. Also, do not overgas the cores—usually indicated by the appearance of a whitish deposit—since that results in a weak, friable product.

Producing Copper-base Alloy

QUESTION We are planning the production of chromium-copper castings and would appreciate information on the practices employed as well as fluxes, deoxidizers, melting, heat treating procedures for hardness and electrical conductivity, etc.

ANSWER A number of copper-base compositions are being used to obtain high hardness or electrical conductivity. In addition to the chromium, these alloys contain small but appreciable amounts of silicon, beryllium, silver, etc. It is our understanding that these are proprietary alloys, and it is advisable to look into that phase before proceeding with the work.

In making the alloys the copper usually is melted under a cover of charcoal, a mixture of 2:1 sodium and calcium fluorides or glass. The charcoal or salt must be dry to prevent pickup of moisture. The copper should be melted rapidly and brought up to a temperature about 100 degrees above the pouring temperature. Then it is deoxidized, using copper-magnesium, calcium, calcium-silicon, calcium-boron, manganese-boron, lithium or 0.2 per cent zinc.

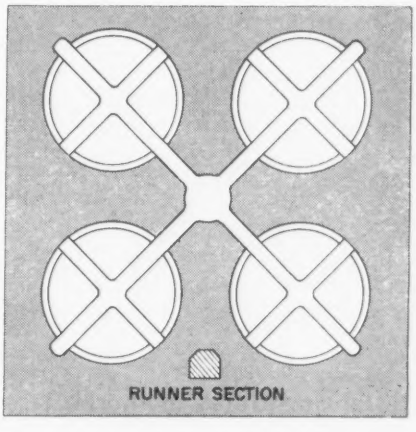
In the case of the 0.08 per cent silicon, 0.80 per cent chromium alloy, the proper amount of 10 per cent silicon copper is added after deoxidation and stirred in with a graphite rod. Then the 5 per cent chromium-copper alloy is added, it being pushed beneath the surface with the graphite rod. It probably will take 10 to 20 minutes for the chromium-copper to dissolve and for the metal to come up to temperature. As soon as temperature is reached, the castings should be poured. Pouring temperature will depend on section thickness and is around 2200° F for light, 2150 for medium and 2070 for heavy sections.

Best properties in tensile strength, hardness and conductivity are obtained by heating one to two hours at 1740° F, water quenching, then reheating at 930° F for one to three hours and furnace cooling. Reheating too long will tend to reduce the hardness. Where only highest conductivity with the usual properties of soft copper is desired, heating at the lower temperature only is required. Where conductivity is involved, the alloy should be as free as practical from such elements as tin, zinc and iron.

Changes Suggested in Molding

QUESTION We are having considerable trouble in producing some red brass plumbing ferrules 4⅜ in. in diam, 4⅜ in. high with ⅛-in. wall. We use a flat back plate with six patterns and a 14 x 18-in. flask, 5 in. copes and drags. Patterns leave their own green sand cores. Molds are made on a squeezer machine. Castings are gated individually at the top edge with three ¾ x ¼-in. radial gates. Castings either contain holes or run short. Alloy is 85-5-5-5 and poured at 2300° F using a pyrometer. Trouble seems to be from trapped gas, but changing sand does not help.

ANSWER We believe that your difficulty is caused by the individual gating and pouring practice. Thin castings such as these are difficult to produce in the first place because of rapid solidification; consequently, sand condition, gating and pouring temperature must be correlated for satisfactory results. With individual pouring, the gases from the filled cavities tend to enter the adjoining unfilled cavities or the steam condenses on the walls, and trouble results.



Sketch showing suggested arrangement for gating of brass ferrule castings

The best procedure is to arrange the castings so that several are poured at one time from a single sprue. Considering the thin section involved, we believe it advisable to limit the arrangement to four castings. They can be accommodated nicely in a 14 x 14-in. flask.

As indicated in the accompanying sketch, the castings are located equidistantly around the central sprue. Gating system is in the cope. Because of the rapid solidification which takes place we suggest a shallow cope, since little if any feeding will occur. Runners suggested are ½-in. square with the corners rounded off. The main runners should be extended slightly beyond the outer edge of the castings to serve as dirt catchers for the first surge of metal. Gates open into the tops of the castings. Suggested sprue is tapered from top down, with the bottom opening ¾-in. in diam.

It might be pointed out that these suggested dimensions for the gating system are only starting points. After trials to observe the results obtained, suitable changes can be made to obtain the most satisfactory results for the castings.

Investment Molding Methods

QUESTION We want to make a few small, smooth-surfaced, intricately shaped castings for experimental purposes, and believe that the lost-wax process is the solution. Hence, we will appreciate information on types and sizes of investments, binders, etc. Can good aluminum castings with walls as thin as 1/16-in. be produced without using air pressure? Should the metal be poured into the mold before it cools after burning out the wax, or can the mold be allowed to cool?

ANSWER A wide variety of investment compositions are on the market for nonferrous and ferrous alloys. Materials for nonferrous alloys mainly are gypsum or plaster of paris with some silica, while those for ferrous alloys principally are silica. Recent addition to the field is a special powdered glass.

In commercial practice the usual method is to employ two types of investment—a very finely divided material to form the face, and a coarser material for the backing. Fine material may be applied to the disposable pattern by dipping in a slurry several times and drying between coats until the desired thickness is built up. Again the pattern may be dipped into the slurry, which is

allowed to become tacky, and then additional fine material is blown or sprayed on.

Another procedure is to coat the pattern with a solution of ethyl silicate or silicate of soda by spraying or dipping, and when it becomes tacky the fine material is blown or sprayed on. After the fine coating material has air-dried sufficiently, the pattern and coating is placed in a flask and the coarser backing material in the form of a slurry is poured around it and vibrated into position to form a compact mold. After another period of air drying, the mold is placed in a furnace where it first is heated at a low temperature to melt out the wax, and then fired at high temperature to make sure that the wax is removed completely.

Molds usually are filled with metal while at an elevated temperature to prevent cracking of the investment. Temperature of the mold when poured will depend upon tolerances desired, since the expansion characteristics of the investment vary according to temperature and the alloy being poured. High mold temperatures with resultant slow cooling tend to produce coarse-grain structure in most alloys, which may or may not be a factor.

We believe that you will be able to produce castings with the thin sections you mention; because the investment material is dry and at an elevated temperature acts as an insulating agent, it permits the aluminum to remain fluid for a relatively long time. Often where thin sections are involved the investment casters place the mold over an evacuating device and apply a vacuum just before filling the mold.

Wants Fine Surface on Grill

QUESTION While we produce automotive castings from a composition containing 2.25 to 2.55 per cent Si, 3.30 to 3.50 per cent TC, 0.65 to 0.85 per cent Mn and 0.40 per cent max P, we are contemplating the production of some cast iron grills for cooking purposes. We would like to know how the fine finish is obtained on cast iron kitchen ware. How is the dark appearance obtained? What is meant by the expression that the utensils do not require any breaking in? Are the pots machined on the inside to obtain the usual finish?

ANSWER The fine finish on the interiors of cast iron kitchen ware is obtained by grinding and polishing. Grinding is accomplished with grinding wheels of various shapes to reach all parts, and that is followed by operations with abrasive-impregnated, fabric wheels known as set-up or polishing wheels. No machining operations are used, and the grinding and polishing operations remove $\frac{1}{32}$ to $\frac{1}{16}$ in. of metal. Only the interior and bottoms of the ware are treated —the latter primarily to obtain flatness. Smooth surface on the exterior is obtained by use of fine molding sands.

The breaking-in process you refer to, we understand, is accomplished by coating the surfaces of the ware with a vegetable cooking oil, and then subjecting the ware to an elevated temperature, but below the burning point of the oil. This process eliminates the need for the housewife to perform the operation; it also protects the ware from rusting during storage.

Increase Green Sand Strength

QUESTION We are interested in obtaining more green strength in the sand we use in our brass foundry, and would like to know how we can accomplish it. At present our sand strength is on the low side with a green strength of 3.4 psi, permeability of 23 and a moisture content of 5.9 per cent.

ANSWER There is no doubt your sand is on the low side for green compression strength; it is only about half the usually suggested figure of 7 psi. We believe it can be increased to a satisfactory point, however, through addition of bonding clay or southern bentonite, or a mixture of both.

Since it is difficult to determine just how much bonding agent will be required, we suggest you take a batch of 400 to 500 lb of sand and gradually add to the selected bond until the desired strength is obtained. Then make up some molds with that sand to see how it functions. If it is satisfactory, then you can make the proper additions to the sand in the foundry.

You probably will find that the additions of bond will reduce the permeability, but not sufficiently to cause trouble.

Metal Penetrates the Cores

QUESTION Cores we presently are using in our brass castings cause trouble by burning in, and we would like some suggestions on a suitable mix. The cores range from 1 to 5 in. in diam and are 14 in. long.

ANSWER Possibly the sand you are using for the cores is too coarse, resulting in large surface voids into which the metal can penetrate. You might try the addition of fine molding sand, fine silica sand or silica flour to close it up.

You do not mention whether the burn-in applies to all sizes of cores or to only certain sizes. If you are baking all sizes of cores for the same length of time at the same temperature, you will have trouble from either over-baked or under-baked cores, depending upon whether the time cycle is based on the large cores or the small ones. Cores in either of those conditions will permit metal penetration. With under-baked cores the excessive amount of gas resulting from distillation of the uncombined binder, reacts with the molten metal to create hot spots and burning in. Over-baked cores have friable surfaces which collapse too soon and permit metal penetration.

While you refer to brass castings, possibly the cores are being used with phosphor bronze, which is highly fluid and easily penetrates any openings. In that case some type of core coating material should be used to provide an impervious surface. Numerous materials of this type are on the market. An old procedure is to apply a thin mixture of graphite in molasses water or dilute core oil, and rub well into the surface.

Again the penetration may result from use of more than the usual amount of phosphor-copper (2 oz per 100 lb) in red brass for deoxidation purposes.

Seeks a Facing Sand Mixture

QUESTION Can you supply us with the best mixtures of facing sands for light and heavy steel castings? Also can you give us a formula for cement-bonded sand?

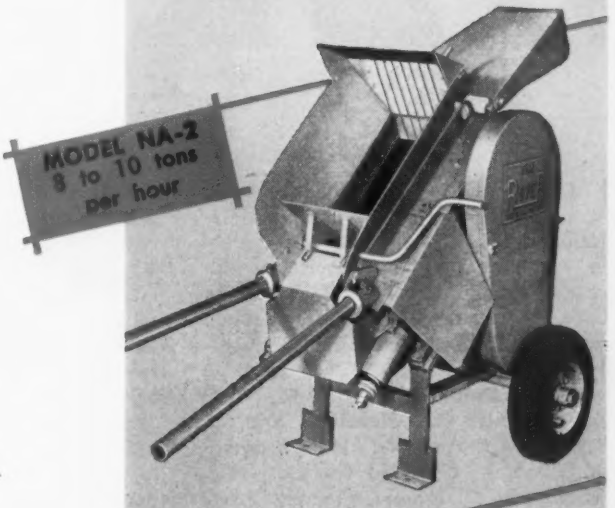
ANSWER Like many other practices in the foundry industry, each foundryman considers his particular facing sand mixture to be the best. The aim, of course, is to have a sand which will give as smooth a surface as possible without running into trouble from blows, washing, erosion, etc., and have the sand peel satisfactorily from the casting surface.

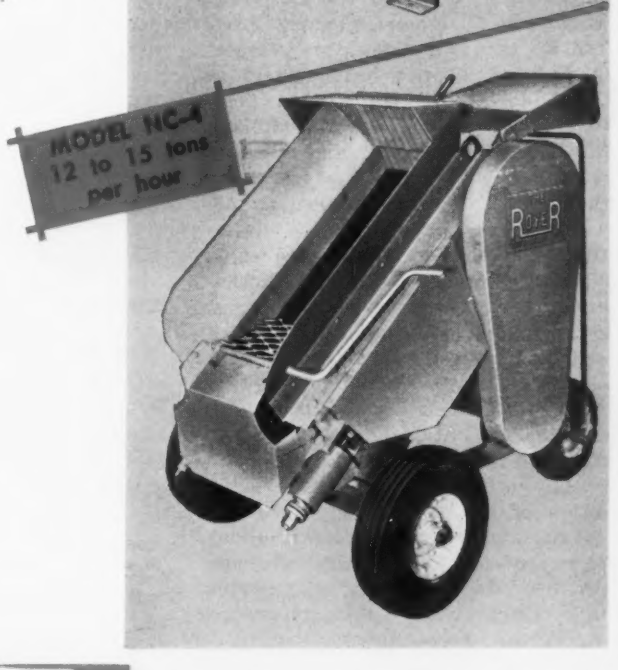
General practice is to use all new sand or large amounts of new sand with some system or backing sand bonded with about 5 per cent bentonite and 1 per cent cereal. New sand is that regularly added, or some times it is a finer grade of sand. You will have to do some experimenting to obtain a satisfactory mixture.

According to Hall's *Steel Foundry Practice*, new silica sand with an AFS grain fineness of 45 to 55 mixed with 13 per cent high early-strength cement and 6 per cent moisture is used for cement-bonded facing sand. Backing sand is composed of crushed and ground old cement sand, 10 per cent cement and 7 per cent moisture. Molds are air dried for about 72 hours before pouring.

PROPERLY PREPARED SAND

for Small Foundries Core Rooms Side Floors





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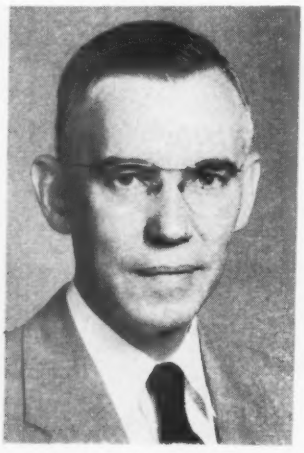
Men of Industry

LEROY P. ROBINSON
. . . retires, A-D-M Co.



J. DONALD JUDGE
. . . director of research

HAROLD F. BISHOP
. . . joins Exomet Inc.

S. C. MASSARI
. . . technical director

LEROY P. ROBINSON, since 1950, vice president, Archer-Daniels-Midland Co., and chief of its Foundry Products Division, Cleveland, will retire Oct. 1, after 39 years in the core oil industry. A native of Iowa, he was graduated from Lombard College in 1906. From 1917 to 1928 he was New England manager for Werner G. Smith Co., Cleveland, and for 8 years of that period also represented Sterling Wheelbarrow Co., Milwaukee. In 1929 he was named director of core oil sales for Werner G. Smith Co., with headquarters in Cleveland, continuing in that position when Archer-Daniels-Midland purchased the company and operated it as Werner G. Smith Division, later the Foundry Products Division. Always active in foundrymen's activities, Mr. Robinson was a member of New England Foundrymen's Association, first secretary of Associated Brass Founders of New England, and an organizer and former president of Northeastern Ohio Chapter of the American Foundrymen's Society. He served as a national director of the AFS and in 1954 received a life membership in that organization in recognition of his outstanding service to the society and for his contributions to improvement of foundry coreroom practice. He has given innumerable talks before various foundry groups throughout the country.

William J. Grede, president, Grede Foundries Inc., Milwaukee, was elected chairman of the executive committee, J. I. Case Co., Racine, Wis. Mr. Grede became a director of J. I. Case in 1953.

J. Donald Judge, formerly chief engineer, has been named director of research and engineering, Hamilton Foundry & Machine Co., Hamilton, O. He joined the company in 1917, while still in high school, and worked there as a co-operative student while attending University of Cincinnati. After graduation in 1924, with a degree in mechanical engineering, he worked in the engineering department and later entered into the production phases of the foundry. In his new position he will correlate research, engineering and production. Mr. Judge's father, James E. Judge, for 28 years was superintendent of Sohn and Rentschler Foundry, predecessor of Hamilton Foundry. A former chairman of the Cincinnati Chapter of the AFS, Mr. Judge is also a member of the FEF Industry Advisory Committee to University of Cincinnati.

Charles P. Whitehead was elected president, National Roll & Foundry Co., Avonmore, Pa. **William A. Curran** and **J. Harvey Johnston** were re-elected vice presidents and **William Johnston Jr.** was named manager of castings sales. Mr. Whitehead is also president, General Steel Castings Corp., Granite City, Ill., parent company of National Roll.

Richard L. Lindland was recently elected president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., division of Textron American Inc. Mr. Lindland joined Campbell, Wyant in 1942, became secretary in 1944, and was named a director in 1952.

Harold F. Bishop recently joined Exomet Inc., Conneaut, O., as technical director in charge of research and development as well as quality and process control. A graduate of Michigan State University, for the past 17 years he was associated with the Naval Research Laboratory, Washington, where he became head of the casting section, metal processing branch. Earlier this year he received the Joseph S. Seaman Gold Medal of the American Foundrymen's Society in recognition of his outstanding contributions in the field of castings research and for his contributions to the society.

S. C. Massari has been appointed technical director of the American Foundrymen's Society, succeeding **Hans J. Heine.** Mr. Massari held the same position from 1946 to 1953, when he left to become manager of the Foundry Division, Hansell Elcock Co., Chicago. Recently he had been director of research, National Engineering Co., Chicago. For 16 years prior to 1942 Mr. Massari was chief metallurgist of the Association of Manufacturers of Chilled Car Wheels

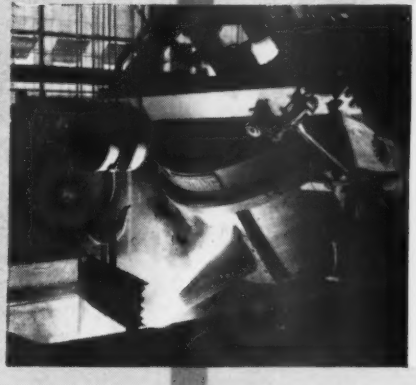
Herbert Geittman Jr., until recently cast iron specialist, Climax Molybdenum Co., New York, has been put in charge of the company's development effort on castings for the machine tool industry.

Walter Poremba, formerly sales engineer, Alloy Precision Castings Co., Cleveland, was named assistant sales

an electric arc

PLUS outstanding engineering developments create a new economy in melting today

The electric arc, a quick, clean source of heat supply for electric furnaces, provides higher thermal efficiency than any other supply of heat. The result is cost reduction and higher quality of product. Whiting Hydro-Arc Electric Furnaces employ this important arc, yet outstanding exclusive Whiting advancements assure a still greater melting efficiency. This is accomplished through the use of a new patented control development that provides a constant arc for automatically heating and melting the charge. Add to this such Whiting features as an automatic electric clamp, simplicity of top charge and air-counter-balanced hydraulic electrode positioning equipment... all contributing to greater savings.



WHITING

Hydro-Arc

Talk over electric furnaces now with a Whiting Hydro-Arc engineer. Find out how, through scientific control and application, Whiting Hydro-Arc Electric Furnaces assure lowest cost per ton of melt.

Whiting Corporation, 15607 Lathrop Avenue, Harvey, Ill.

Manufacturers of Cranes • Trambeam • Trackmobile • Foundry, Railroad and Chemical Equipment

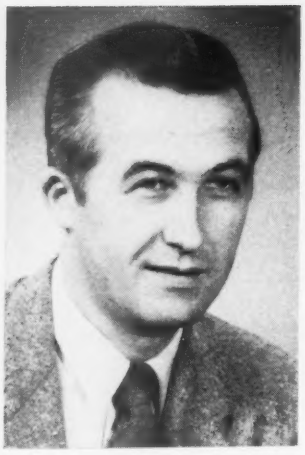
Write for informative bulletins!

Many hints and suggestions for economical electric arc furnace operation are contained in "Facts on Duplexing" (FO-4), "The Electric Furnace In The Iron Foundry" (FO-6), "The Whiting Hydro-Arc Furnace Control" (FO-10). Send for the copy or copies you need right now! Specify by "FO" number.

Circle 641 on Inquiry Card—Page 245

MEN OF INDUSTRY

RICHARD SCHOENFELD
. . . administrative assistant



DALE S. RICHINS
. . . chief metallurgist

CHARLES S. CHISOLM
. . . foundry division supt.

JOHN F. DRENNING
. . . AFS Chapter Chairman

manager. A graduate of Purdue University, he was formerly associated with Precision Metalsmiths Inc., Allyne-Ryan Foundry Co., and Crucible Steel Casting Co., all of Cleveland.

Richard Schoenfeld, until recently manager of the Wheelco Division, Barber Colman Co., Rockford, Ill., was named administrative assistant, Lindberg Engineering Co., Chicago. Temporarily he is re-organizing the company's Cleveland office. Mr. Schoenfeld was previously associated with Hevi Duty Electric Co., Milwaukee.

Wier A. Kellogg, formerly eastern district manager, National Engineering Co., Chicago, has been elected a vice president. Mr. Kellogg joined the company in 1927 as a salesman and was transferred to the New York area in 1932.

James T. Leisk, for the past seven years manager, Swanson Foundry Co., Moline, Ill., has been named plant manager, Fremont Foundry Co., Fremont, O. A graduate of Michigan College of Mining and Technology, he previously was associated with Chicago Hardware Foundry Co., and Western Foundry Co., Chicago, and Wisconsin Steel Division, International Harvester Co., Milwaukee.

Dale S. Richins was named chief metallurgist, Mercast Mfg. Corp., La Verne, Calif., subsidiary of Mercast Corp., New York. A graduate of University of Utah, where he received a master's degree in physical metallurgy, Mr. Richins was a research metallurgist at the unversity for two years. Until recently he was production engineer, Aerojet General Corp., Azusa, Calif., where he was in charge of castings and forgings design.

Charles S. Chisolm was named general superintendent of the foundry division, the Wheland Co., Chattanooga, Tenn., succeeding **Thomas C. Alford,** who has joined the Tri-State Sand Co.

John F. Drenning, chairman of the Birmingham Chapter of the AFS for 1956-57, since 1949 has been metallurgical sales engineer, Kerchner, Marshall & Co., Birmingham. Mr. Drenning was graduated from Carnegie Institute of Technology and formerly was associated for over 8 years with the Duquesne Works, U. S. Steel Corp., Pittsburgh, in metallurgical work and as special engineer.

John M. Mele, formerly abrasive engineer in the Cleveland area, Bay State Abrasive Products Co., Westboro, Mass., has been transferred to the New York city territory. A graduate of Cornell University, he joined the company in 1951.

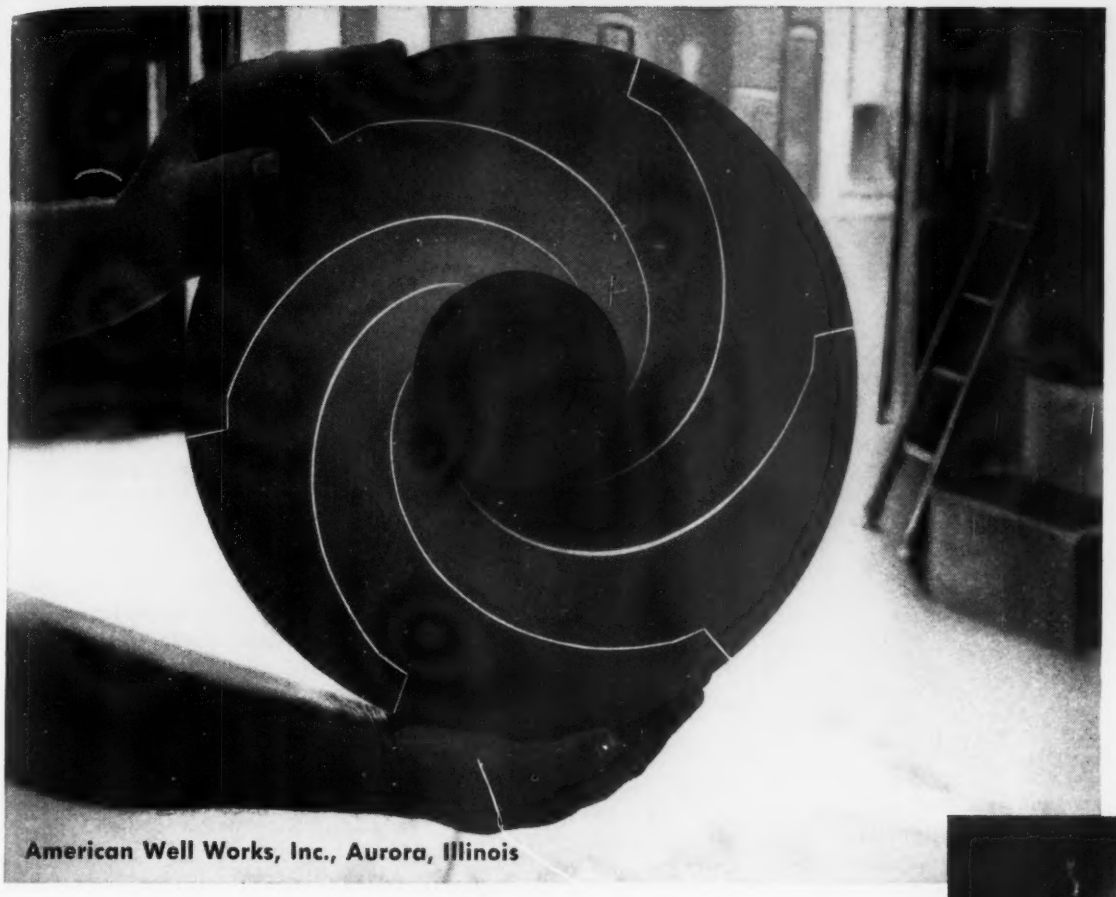
Peter R. Rentschler has been elected secretary and director of Hamilton Foundry & Machine Co., Hamilton, O., and Decatur Casting Co., Decatur, Ind. Mr. Rentschler is the fourth generation member of the Rentschler family to be active in management of the Hamilton

WIER A. KELLOGG
. . . Natl. Engineering v. p.

JAMES T. LEISK
. . . Fremont Foundry plant mgr.

JOHN M. MELE
. . . Bay State Abrasive sales

PETER R. RENTSCHLER
. . . Hamilton Foundry officer



American Well Works, Inc., Aurora, Illinois

"IF IT'S NOT PERFECT, IT MUST BE THROWN OUT!"

Why American Well Works uses Cities Service Delco Core Oil

Mister, you're looking at one of the most complicated cores made—and at American Well Works, it must be perfect or get thrown out.

American has an 86-year reputation to maintain—a reputation for custom-engineered deep well turbine pumps and other equipment for handling water and waste.

For this reason, American carries the making of parts from raw material to finished product. Naturally, that means its own foundries . . . one for iron, another for brass. In each case, however, the brand of core oil is always the same—Cities Service Delco Core Oil.

At the iron foundry, Delco #936 has won high praise for its adaptability to all sized cores, without alteration of the mixture. "It's uniform from batch to batch, has reduced blows to a minimum, and allows us to use one quart of oil for every three required by our previous brand," reports American.

The story is similar in the brass works where Delco #54 is used to make intricate cores for pump castings. "Core and core oil must be perfect," says American, "and we're happy to say they almost always are."

To find out more about Delco Core Oils and results of firms such as American, talk with a Cities Service Representative. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

CITIES SERVICE

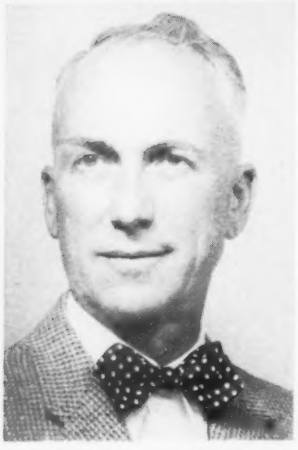
QUALITY PETROLEUM PRODUCTS

Pouring A Casting, American's employees put the core and its core oil to the acid test. Thanks to Cities Service Delco Core Oils, blows have been reduced to a minimum in both the brass and iron foundries.

Many Sized Cores are produced by American Well Works' iron foundry—yet one oil, Cities Service Delco #936, is suited to them all, without alteration of mixture. They now use only 1 qt. of Delco #936 for every 3 required by their previous oil.

MEN OF INDUSTRY

R. A. AEBERLY
. . . Electromet district mgr.



HAROLD W. SCHROEDER
. . . Progressive Foundry v. p.

JACK BEAN
. . . Progressive Foundry v. p.

ALLEN J. FILIPIC
. . . joins Osborn Mfg. Co.

Foundry. He started with the company in 1945, during summer vacations, assuming a fulltime status in 1954 after graduation from Miami University.

R. A. Aeberly was appointed Los Angeles district manager, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York, succeeding **S. L. Jackson,** who has been transferred to New York. Mr. Aeberly, who joined Electromet in 1936, was Chicago office manager for several years and recently was sales and service engineer there.

Harold E. Henderson, chairman of the Northern California Chapter of the AFS for the current year, is sand technician, H. C. Macaulay Foundry Co., Berkeley, Calif., where he has spent 38 years. He started as a molder's apprentice there at the age of 14. For 8 years he was a journeyman molder, working in foundries in Sydney, Australia, and later in various California shops. Returning to the Macaulay foundry he worked as a coremaker, bench and floor molder and foreman prior to becoming sand technician. Recently he served in Turkey for 4 months as a foundry sand consultant for the government.

Gale H. Shackelford was appointed sales manager, Canton Chaplet & Mfg. Co., division of W. L. Jenkins Co., Canton, O. He joined the company last year as technical service manager. Previously he was associated with American Steel Foundries at its Indiana Harbor Works, East Chicago, Ind.

Philip G. Smith, Harold W. Schroeder and **Jack Bean** have acquired Progressive Foundry Co., Perry, Iowa, which will be known as Progressive Foundry Inc. Mr. Smith is president, Mr. Schroeder, vice president-general manager, and Mr. Bean, vice president, and secretary-treasurer of the company. Mr. Smith is also president, Electric Alloy Steel Co., and the Philip G. Smith Co., Lincoln Park, Mich. Mr Schroeder was formerly vice president-operations, and Mr. Bean, president, of Michigan Steel Casting Co., Detroit. Mr. Bean also owns and operates the Jackson Metal Co., Detroit.

Allen J. Filipic was appointed sales engineer in New York, Maryland and western Pennsylvania for Osborn Mfg. Co., Cleveland. Mr. Filipic received a master's degree in engineering administration from Case Institute of Technology.

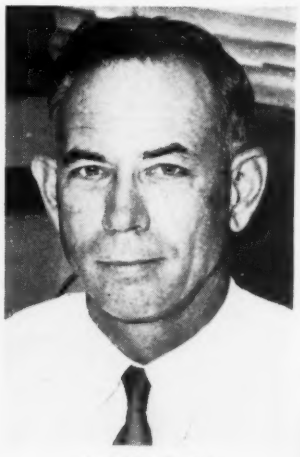
Joseph White recently joined Conco Engineering Works, Mendota, Ill., as district sales manager of materials handling equipment in the Chicago area, with headquarters at the company's Chicago office. He has been engaged in sale of cranes and hoists for many years.

George Bush was named South Central sales manager, Cleco Air Tool Division, Reed Roller Bit Co., Houston, Tex. He joined Reed Roller Bit Co. in 1941 and was trans-

HAROLD E. HENDERSON
. . . heads AFS Chapter

GALE H. SHACKELFORD
. . . becomes sales mgr. ,

JOSEPH WHITE
. . . joins Conco Engineering



GEORGE BUSH
. . . district sales mgr.

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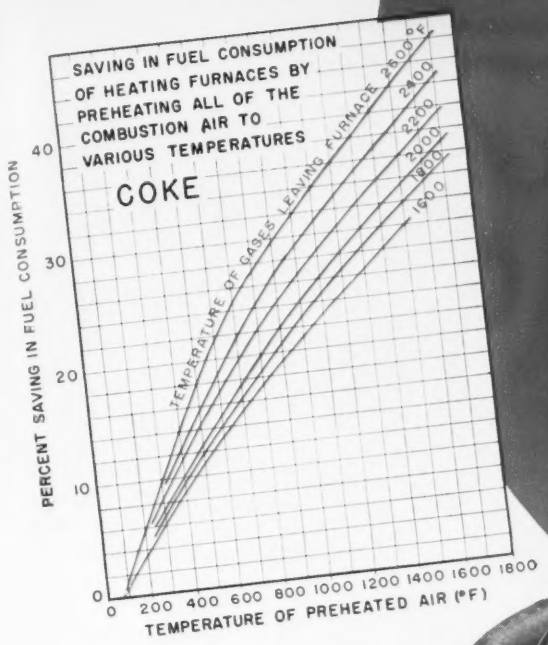

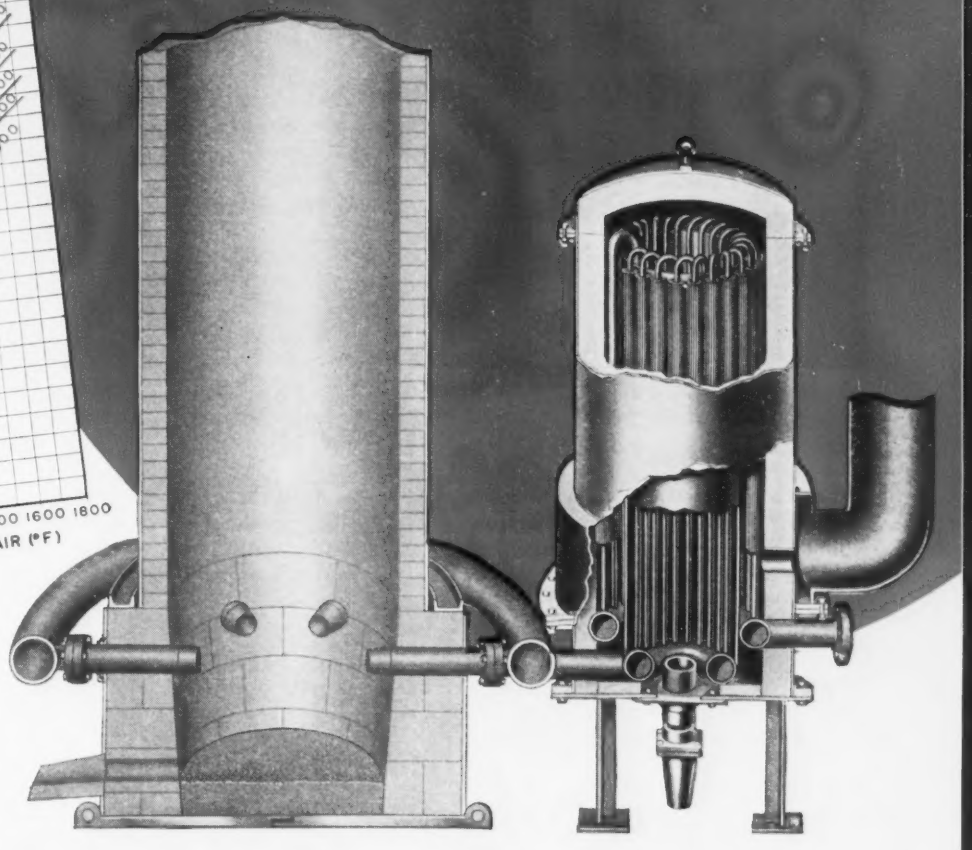

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OIL AND GAS FIRED HEATERS

WHY WASTE COKE? Make your initial melt faster — get hotter iron — maintain better control of your analysis, and cut coke costs with Brown Fintube Type 104 Fired Heaters. More than 200 installations now in successful service on a wide variety of high temperature air heating applications. Delivers air at 1000° F in from 2 to 3 minutes.

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MEN OF INDUSTRY

ROBERT A. COLTON
. . . AFS Chapter Chairman

HENRY R. WILLIAMS
. . . becomes sales mgr.

HAROLD R. WOLFER
. . . heads AFS Chapter

STEWART E. DANBY
. . . district representative

ferred to the Cleco Division in 1950. Mr. Bush succeeds **E. W. Clayton,** who has been named manager of sales development for the division.

Robert A. Colton, chairman of the Metropolitan Chapter of the AFS for the current year, is a research engineer Federated Metals Division, American Smelting & Refining Co., Newark, N. J. A graduate of Carnegie Institute of Technology, he did graduate work there and later was employed in its Metals Research Laboratory. Since joining Federated Metals Division over 10 years ago, his time has been devoted to copper-base alloy research and more recently to production, sale and technical servicing of brass and aluminum alloys sold to foundries. Mr. Colton is a member of the executive committee of the Brass and Bronze Division of the AFS, as well as being active on a number of technical committees.

Russell S. Whitehead was named Southeast district sales manager, Electro Refractories & Abrasives Corp., Buffalo, responsible for sales of the company's products in the St. Louis to Birmingham area. **Donald W. Withrow** was appointed sales representative in Alabama, North and South Carolina, Tennessee, Mississippi and Georgia, with headquarters in Birmingham. **Arthur L. Rose Jr.** was named sales representative for grinding wheel sales in the Detroit area.

William O. Sweeny and **Walter P. Jacob** were elected directors of Arwood Precision Casting Corp., New York. Mr. Sweeny is Arwood's vice president in charge of sales. Mr. Jacob is board chairman of Hartford Electric Steel Co., Hartford, Conn., and Northeastern Steel Corp., Bridgeport, Conn.

Louis Dill was appointed merchandising manager, George F. Pettinos Inc., Philadelphia. Mr. Dill, who is also secretary of the company, has been in the sales department since 1918. **Henry R. Williams** was appointed sales manager, a position which Mr. Dill has held since 1943. Mr. Williams has been the company's sales representative in the Pennsylvania and southern territory since 1945.

Lewis W. Douglas, chairman of the board, Mutual Life Insurance Co., and **Julian B. Beaty Jr.,** partner in the law firm of Reeves, Todd, Ely & Beaty, both of New York, were elected directors, Nichols Engineering & Research Corp., New York.

JOHN S. TIEDEMANN, appointed assistant superintendent, Minneapolis Electric Steel Castings Co., Minneapolis, as reported in August

E. J. Hyche, executive vice president, Rich Mfg. Co. of California, Los Angeles, was appointed chairman of the technical committee, Cast Iron Soil Pipe Institute. He has served on the committee since its formation. Mr. Hyche has been with Rich Mfg. Co. since 1935.

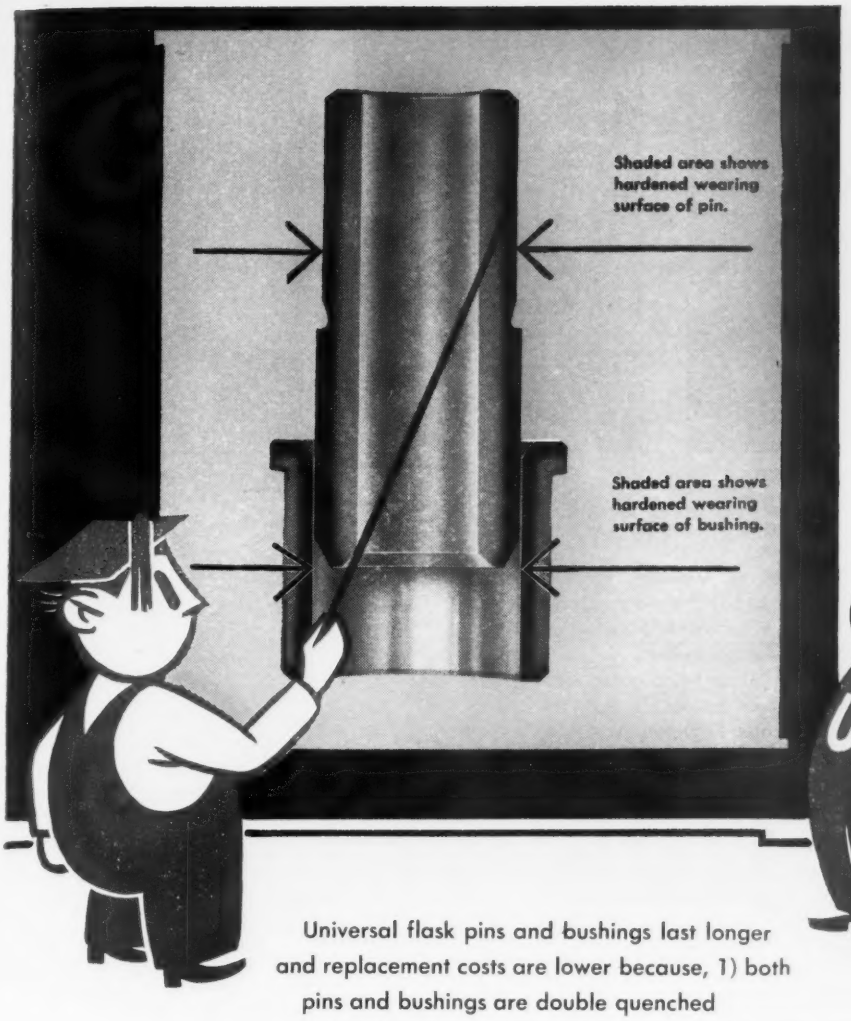
Harold R. Wolfer, elected chairman of the Washington Chapter of the AFS for 1956-57, is quarterman molder at the Puget Sound Naval Shipyard, Bremerton, Wash. He attended Washington State College and entered the Naval Shipyard in 1938 as an apprentice, was promoted to supervisory status in 1943, becoming quarterman molder in 1945. Since 1951 he has also served as shop personnel supervisor. Mr. Wolfer was vice chairman of the chapter last year.

Stewart E. Danby has been appointed district representative for the Western area, Koehring Co., Milwaukee, and for three of its subsidiary manufacturing companies: Parson Co., Newton, Iowa; C. S. Johnson Co., Champaign, Ill., and Kwik-Mix Co., Port Washington, Wis.

Hjalmar A. Anderson has been appointed sales engineer, Industrial Furnace Division, Gas Machinery Co., Cleveland. A graduate of Chicago Technical College, he was formerly chief project engineer, Lindberg Industrial Corp., Chicago. **William A. Anthony** will head engineering and sales of a new line of mixers for Gas Machinery. A graduate of Case Institute of Technology, he was previously associated with Colonial Iron Works Co., Cleveland.

Charles L. Swinden and **Willard J. Hannon** have been appointed sales representatives, Leschen Wire Rope Division, H. K. Porter Co., St. Louis. Mr. Swinden has been assigned to a territory in California and Nevada. Mr. Hannon will cover western Illinois, St. Louis, and most of Missouri.

Jack Peters was appointed general manager, Jervis B. Webb Co. of California, Los Angeles, subsidiary of



how the long life of UNIVERSAL flask pins and bushings saves dollars in your foundry operations

Universal flask pins and bushings last longer and replacement costs are lower because, 1) both pins and bushings are double quenched and double drawn to produce strong, ductile cores that can take rough treatment in the foundry without breaking or chipping and, 2) wearing surfaces are carburized and hardened to withstand wear. Universal flask pins and bushings are precision ground to insure instant, accurate alignment of cope and drag. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

185

UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

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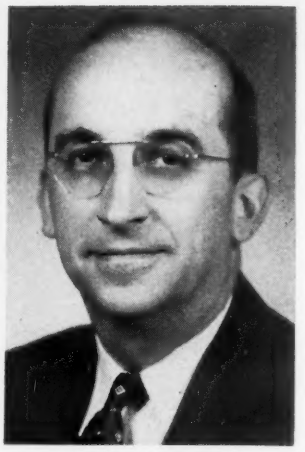
MEN OF INDUSTRY

H. R. LOXTERMAN
. . . division sales mgr.

CHARLES B. MARTIN
. . . Norton abrasive sales

CHARLES R. TIGHE
. . . advertising mgr.



JOHN NABREZNY
. . . Detroit Chapter chairman

Jervis B. Webb Co., Detroit, succeeding **Paul Kuhn,** vice president and general manager, who has retired but will continue as a consultant. Mr. Peters, a graduate of University of Detroit, was formerly sales manager of Webb of California.

H. R. Loxterman was named general sales manager, Equipment Division, Blaw-Knox Co., Pittsburgh, succeeding **Arthur A. Levison,** who has joined the company's fabricated products group. Mr. Loxterman, with Blaw-Knox since 1930, has been assistant general sales manager of the Equipment Division since 1952. He continues as sales manager for steel plant equipment . **Edward W. Pottmyer,** formerly chief product engineer of the steel plant equipment department, was appointed manager of engineering and development for the Equipment Division. With the company for 29 years, he succeeds **A. H. Jackson** who has become the division's general manager.

Daniel L. Weller was named technical sales and service representative in the Pittsburgh office, Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York. A graduate of Carnegie Institute of Technology, Mr. Weller was formerly a product metallurgist in Syracuse, N. Y., for Crucible Steel Co. of America.

John J. McGlone was elected vice president of the Williams Bucket Division, Wellman Engineering Co., Cleveland. He will continue as general manager of the division.

Karl F. Ewerhardt, formerly advertising manager, Leschen Wire Rope Division, H. K. Porter Co., St. Louis, has been appointed assistant general sales manager of the division.

Charles B. Martin, formerly field engineer in the Pittsburgh office, Norton Co., Worcester, Mass., was named abrasive engineer in West Virginia. Prior to joining the company in 1945, he was an inspector for the Pittsburgh Rolls Division, Blaw-Knox Co., for 12 years.

Charles R. Tighe, for the past 5 years assistant advertising manager, Joseph Dixon Crucible Co., Jersey City, was appointed industrial advertising manager. He joined the company in 1950 as sales promotion manager in the paint sales division. In the new post Mr. Tighe assumes some of the duties of **John J. Leckie** who has retired as advertising and sales promotion manager after 53 years with the company. Mr. Leckie will continue as a consultant with Dixon.

William Hanson Jr., formerly assistant manager of conveyor products, Joy Mfg. Co., Pittsburgh, has been appointed manager of conveyor products at its New Philadelphia, O., plant. A graduate of University of Wisconsin, he joined the company in 1951 as a designer.

C. L. Thompson was appointed material handling sales manager, and **D. Kuethe,** assistant material handling sales manager, Buda Division, Tractor Group, Allis-Chalmers Mfg. Co., with headquarters at the Milwaukee home office.

Richard E. James Jr., formerly service engineer in the Birmingham branch, Thor Power Tool Co., Aurora, Ill., has been appointed manager of the new Indianapolis branch of the company. **John P. Bank,** since 1948 works manager of the Aurora, Ill., plant, has been named sales engineer of the company.

John Nabrezny, who has been named chairman of the Detroit Chapter of the AFS for the coming year, is sales manager, Michigan Malleable Iron Co., Detroit. Previously he was plant engineer and general superintendent at Michigan Malleable. He attended Wayne University and for 5 years was associated with Revere Copper & Brass Inc., New York, and Cadillac Motor Car Division, GMC, Detroit.

Ralph M. Enriquez, president, Aluminum Products, Los Angeles, was recently appointed a member of the 48th State Agricultural District Board, by Goodwin J. Knight, governor of California. The district sponsors the annual Great Western Livestock Show.

G. Robert Kitzsteiner was appointed sales engineer, Lacledе-Christy Co. Division, H. K. Porter Co., St. Louis, where he will handle the company's sales in Missouri, Arkansas, and other states in the St. Louis sales district.

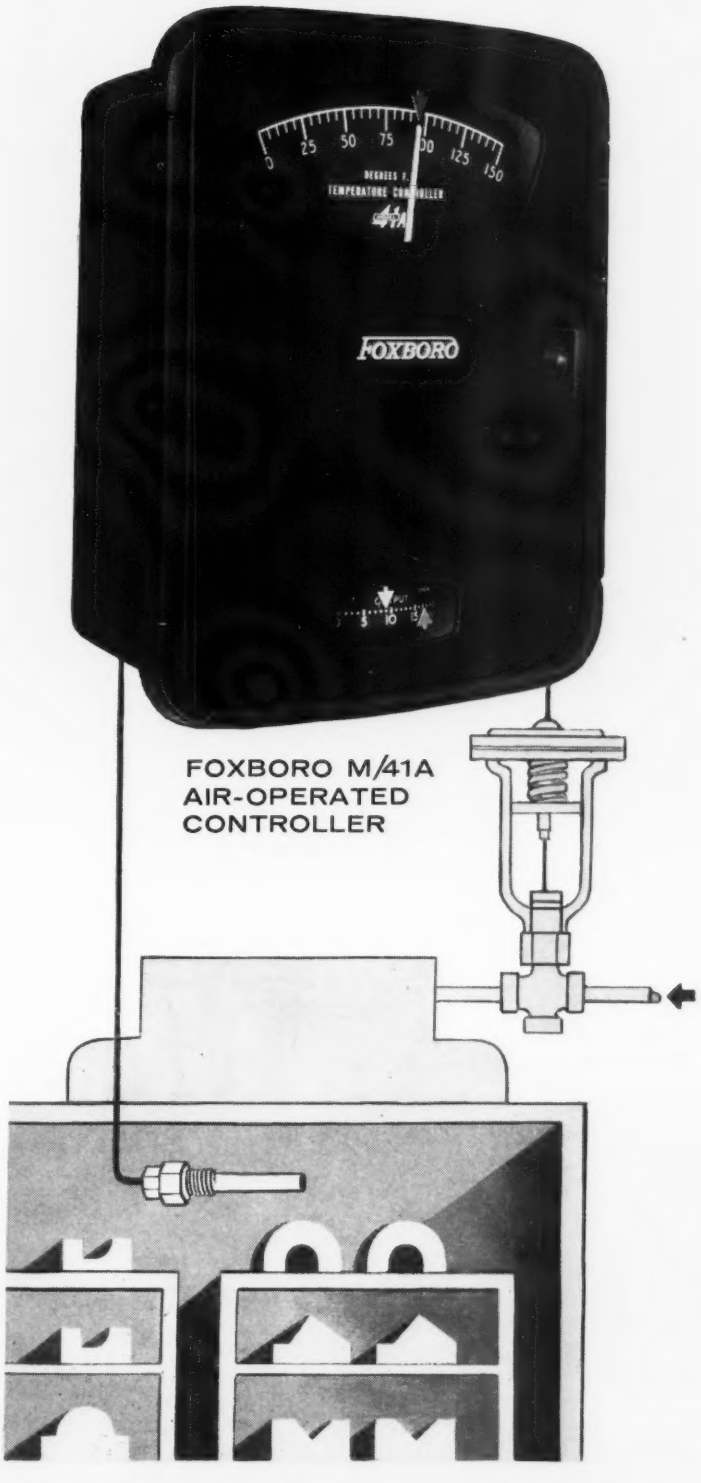
J. Francis Carle, director of education and training, Lincoln Extension Institute Inc., Cleveland, was awarded a recognition certificate by the American Material Handling Society at its recent exposition in Cleveland.

Charles Gruet was named manager of the Manhattan sales office of Hyster Co., Portland, Oreg. He had been Northeast district representative of Hyster's tractor equipment division, since he joined the company in 1954.

Gordon L. Briggs was appointed Western manager, Harris Calorific Co., Cleveland, with headquarters in Spokane, Wash.

WHY RISK CORE FAILURES?

... meet critical baking requirements precisely



FOXBORO M/41A
AIR-OPERATED
CONTROLLER

WITH FOXBORO M/41 CORE OVEN TEMPERATURE CONTROL

You can be *sure* that you are maintaining the critical baking temperatures which today's complex sand mixes require . . . when your core oven is equipped with the Foxboro M/41. There's no guesswork: This Controller's large indicating scale continuously shows "set" temperature and actual oven temperature . . . proves to the operator that cores are getting the specified bake *precisely*. And models are available for every type of heating system.

Both the M/41A (air-operated) and the M/41E (electric) sense the smallest changes in temperature . . . both respond with positive-power control action. Both are high-accuracy devices, built for years of dependable, trouble-free service.

Protect the quality of your core production with quality core oven control. Specify Foxboro M/41 Temperature Control (air-operated or electric-operated) on new equipment, or install easily and quickly on your present ovens. For detailed information, write **The Foxboro Company, 329 Neponset Ave., Foxboro, Mass.**

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

FOXBORO
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COMPLETE FOUNDRY INSTRUMENTATION

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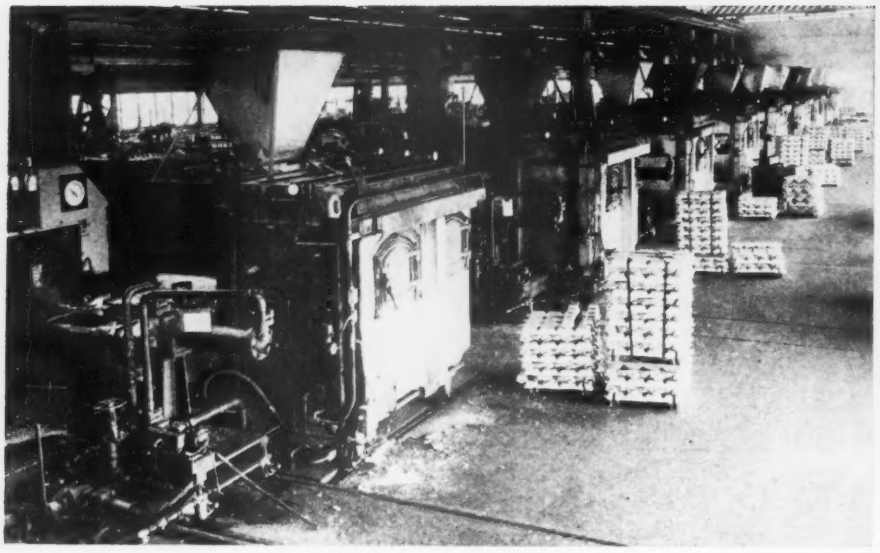
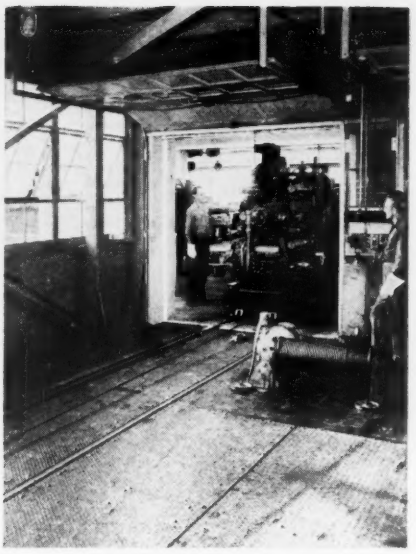


View of die casting machines on production line at the new Pottstown, Pa., plant of Doehler-Jarvis shows tracks on which units are anchored



Replacement machine, ready to go, is moved into trolley for transfer

DIE CHANGING

Is Rapid in New

DIE CASTING PLANT

ALUMINUM is transformed in one day from ingot to die castings, packed in cases and ready for shipment at the new $5 million die casting plant of Doehler-Jarvis Division, National Lead Co. Located in Stowe Township, Pa., just outside Pottstown, this operation complements the Doehler-Jarvis plant which has been in operation in Pottstown since 1924. The building itself is a two-story, modern structure covering 210,000 sq ft.

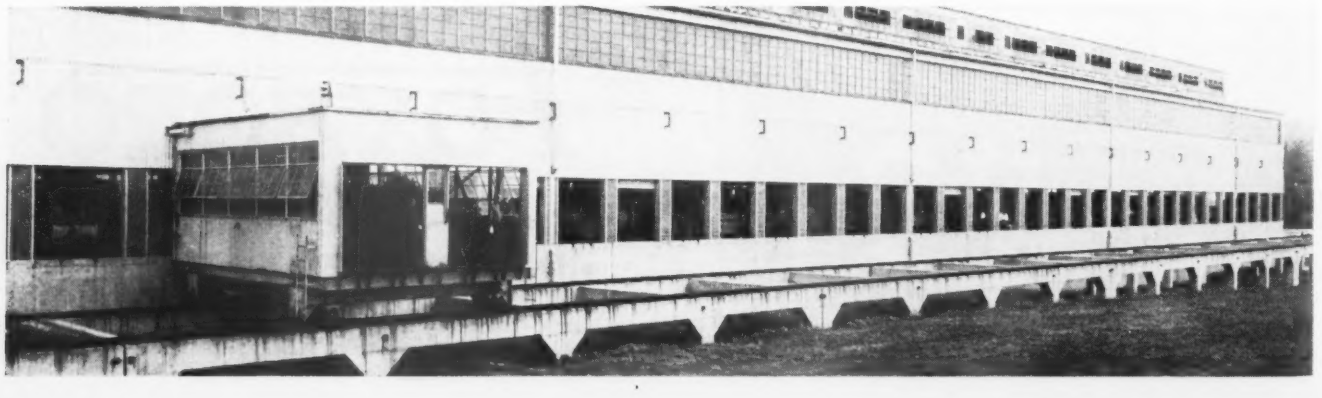
A unique feature of the new plant is the physical setup of the die casting machines. Each machine is anchored at its working location on "trolley" tracks. When an order of die castings has been completed and the die must be changed, all lines supplying electricity, hydraulic pressure and water are disconnected. A track-guided "trolley building" which runs the entire length of the main building comes alongside and lines up its tracks with those of the die casting machine. The entire machine then is power-pulled into the trolley building and sped to the service area. Meanwhile, another machine, already preheated and equipped with another die, is brought in to replace the one which has been withdrawn and is connected to the utility lines. The unit which has been withdrawn is serviced, another die is mounted, and the machine is ready for the next exchange.

Time involved to dismount one die and to mount another at the end of a production run consumes from a few hours to as much as 15 or 20. With the replacement system used at the new plant, nonproductive time is reduced to 20 or 30 minutes.

Its hydraulic system is the second unusual feature of this modern plant. Hydraulic pressure at 1275 psi is used to force molten metal into the steel dies. This pressure is created by centrifugal hydraulic pumps and distributed from a central hydraulic area in 10-in. pipes.

The plant was designed to take advantage of all space in it, and operations are conducted on a straight-line basis. All casting ma-

Outside view shows trolley building, at left, as it moves a machine which has finished the production run on a die to the service area



End jar-caused maintenance with TABOR-SHOCKLESS FULL-POWER JOLT

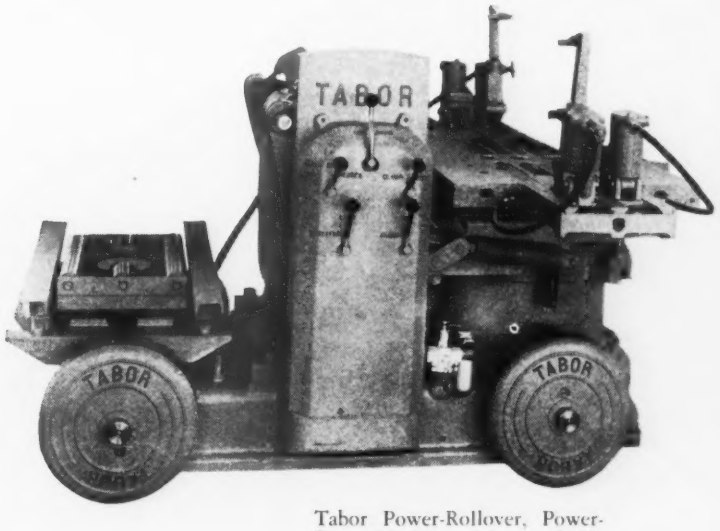
Earthquake shocks that used to be a necessary evil in foundry (particularly core-room) operation can now be avoided without loss of full-power jolt. It's the Tabor-shockless principle that does the trick.

The Tabor Power-Rollover, Power-Draw Machine shown here gives full ramming effect on the sand . . . with shock divided between the falling table and the rising anvil. Reduces costly maintenance on the machine itself, and on surrounding equipment.

If you want all your equipment to last longer, work better, find out about the Tabor-shockless principle today. Write for Tabor literature or ask to see the Tabor man — the technical man.

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

PROOF!
that a full-power jolt can be completely shockless. A quarter placed on edge on the base of a Tabor-Shockless Machine remains standing even after full-power jolt.



Tabor Power-Rollover, Power-Draw Machine with completely shockless full-power jolt.

TM

THE TABOR MAN

IS A TECHNICAL MAN

TM

TABOR

Circle 646 on Inquiry Card—Page 245

The "PLANOBOT" - another example of PLANET'S Automation Engineering

The "PLANOBOT", which served cokes to visitors at Planet's booth, was a hit at the Foundry Show. It picked up, opened and poured the coke and then returned the bottle automatically. It was designed by Planet for an automotive manufacturer to transfer die castings automatically from machine die to the next operation.

This machine has a timing plate which controls any desired cycle combination of movements . . . the grasping device on the horizontal arm opens and closes and rotates 360 degrees and the arm will extend or retract, raise and lower, and rotate 360 degrees. Adjustments can be made in a matter of minutes to set the "PLANOBOT" for an entirely different cycle of operations. It is truly a Universal Transfer Device.

The "PLANOBOT" is just one example of Planet Corporation's engineering and designing skill. Planet engineers are experienced in applying automation to casting handling systems, cooling conveyor systems, briquetting systems, core sand systems, molding sand systems, and shell molding systems. Let them help solve your problems. Write or call today for a Planet Sales Engineer. There's no obligation, of course.

PLANET CORPORATION
1818 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

IT PAYS TO PLAN WITH PLANET

64

chines are on a straight line, and trimming operations take place on a straight line behind them. After trimming, castings are machined where required, inspected, packed and lowered to the loading platform. They are used by manufacturers of household appliances and office, communications and electronics equipment.

All casting, trimming, machining and inspection operations are conducted on the second floor. This arrangement permits more handy use of the outside trolley for machine changes and increases efficiency of the ventilation system. The first floor consists of office space, a cafeteria, locker and shower rooms, the hydraulic and power areas and a space for displaying the end products of the users of the plant's die castings.

Lists 1200 Safety Films

The 1956 "National Directory of Safety Films" now is available. A compact source of information on films on safety, first aid, fire prevention and civil defense, it describes more than 1200 films available without restriction on distribution. Information includes millimeter size, running time, color, year of production and a brief summary of each.

Each film is available for purchase, rental, loan or long-term lease from one or more of 292 distributors. The directory includes a separate listing for those organizations which limit distribution to specific areas in the United States and Canada. A single copy of the directory may be purchased for $1 from the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

"So you've been down in the foundry showing the boys that their president still is the 'Best dad blamed molder in the shop', I see"

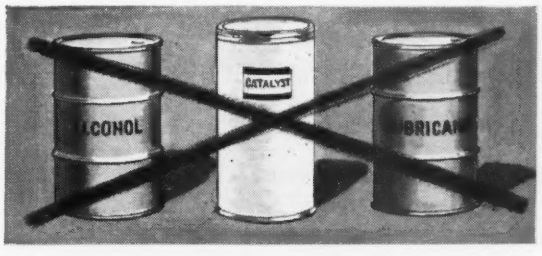
←Circle 647 on Inquiry Card—Page 245

NEWS FOR SHELL MOLDERS FROM RCI

New RCI system simplifies cold coating of sand

May be used for producing shell molds or shell cores by dump box or blowing methods

Now, with the new RCI system, *all you need is two materials* for cold coating sand (besides the sand). One is a powdered phenolic resin, RCI FOUNDREZ 7555. The other is an alcohol solution of a phenolic resin, RCI FOUNDREZ 7150.



No longer do you need to purchase and handle alcohol, catalysts, lubricants and so forth.

Amount of resin needed: The amount of resin required for a given mix will, of course, depend on whether you are coating sand for dump-box operation or for blowing shells and cores (and will vary considerably with the type of sand used). But the experience of RCI Technical Service men in the field indicates that for shell cores about 2-4% resin will be satisfactory. For dump-box operations or blown shells a range of 3-5% will generally be enough.

Other Advantages of RCI coating system

1. **Speed of coating**—release of alcohol from the resin itself accelerates actual coating of the sand. You cut mulling time about 35 to 45% . . . **reduce resin dust, too.**
2. **Strength of bond**—because the RCI system coats more efficiently than the powder and alcohol method, you get greater dry tensile strength (on an equal solids basis). You also get better economy and reduced gas content.
3. **Rate of production**—lowered investment time as well as cure time with this system gives you a higher rate of production for both cores and molds.
4. **Release characteristics**—you will find a marked improvement in the ease with which cores and molds are released from the boxes and patterns.
5. **Resin stability**—both the powdered resin, FOUNDREZ 7555, and the liquid resin, FOUNDREZ 7150 are very stable. You can store them for long periods of time (the powdered resin kept cool and dry to prevent lumping).

Write for full information. If you would like to know the procedure and typical formulations for simplified cold coating with the new RCI system, write today for *Technical Bulletin F-10.*

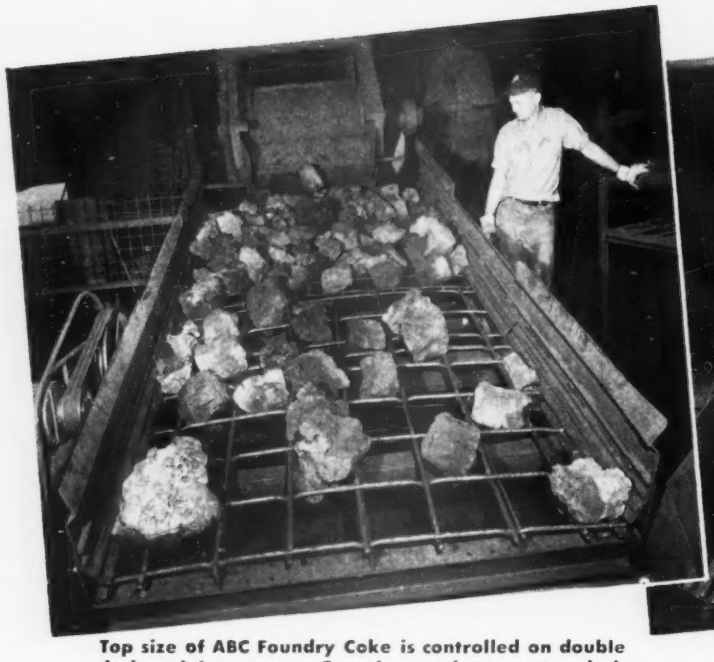
Creative Chemistry . . .
Your Partner in Progress

RCI

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.



Top size of ABC Foundry Coke is controlled on double deck scalping screens. Oversize passing over top deck is crushed and returned to screen feed. Bottom deck removes undersizes.

Finishing screen removes any undersize coke still remaining after primary screening process.

Modern Screening System Closely Controls Sizes of FOUNDRY COKE

ABC Foundry Coke is precisely sized to suit any cupola operation from the largest to the smallest. In its coke screening system recently modernized at a substantial cost, vibrating screens eliminate undersized coke. Duplicate screening stations and rapid change of screen decks to different size openings give desired flexibility and help speed the prompt servicing of customers' orders. Whatever the requirements of your cupola operation, you will find the right size and the right quality of ABC Foundry Coke to give you the most efficient melting performance. Your inquiries are invited.

ALABAMA BY-PRODUCTS CORPORATION

General Sales Office: First National Building, Birmingham, Alabama

Sales Agents:

GREAT LAKES FOUNDRY SAND COMPANY, Detroit; ST. LOUIS COKE & FOUNDRY SUPPLY COMPANY, St. Louis; THE RANSON AND ORR COMPANY, Cincinnati; KERCHNER, MARSHALL AND COMPANY, Pittsburgh; BALFOUR, GUTHRIE & COMPANY, LTD., San Francisco; ATWILL COKE AND COAL COMPANY, Chicago.

Industry Briefs

SUPERIOR Brass & Aluminum Casting Co., 326 South Hosmer St., Lansing, Mich., has been sold by C. D. Coffman and M. B. Fiandt, owners and operators for the last 32 years. New owners are W. W. Edwards, formerly with Duo-Therm Division, Motor Wheel Corp., Lansing, and C. C. Sigerfoos, who will continue as professor of metallurgical engineering, Michigan State University, East Lansing.

Milwaukee Aluminum & Brass Foundry Co.'s Saukville Centrifugal division plant, Saukville, Wis., was destroyed Aug. 1 by a fire which caused $75,000 to $100,000 damage. Milwaukee Aluminum & Brass had taken over the site in May and used it to produce centrifugal castings. The ruined 60 x 120-ft frame and sheet metal building will be replaced with a concrete and steel structure.

NRC Equipment Corp., a subsidiary of National Research Corp., Newton Highlands, Mass., has appointed two new representatives. W. C. Davis & Associates, 3133 Maple Drive, Atlanta, will represent the company in the southeastern section of the United States. In Ontario and Quebec, Winnett Boyd Ltd., 745 Mt. Pleasant Rd., Toronto, will be exclusive agents.

Prenco Products Inc., Hazel Park, Mich., has been granted exclusive license to manufacture the Harmark line of foundry products in the United States by Harborough Construction Co., Market Harborough, England. These products include binders, dressings and adhesives for use with the CO_2 process.

Federated Metals Division, American Smelting & Refining Co., New York, is producing phosphor-copper for the first time on the West Coast at its San Francisco plant. The plant is producing both shot and 14-lb waffles.

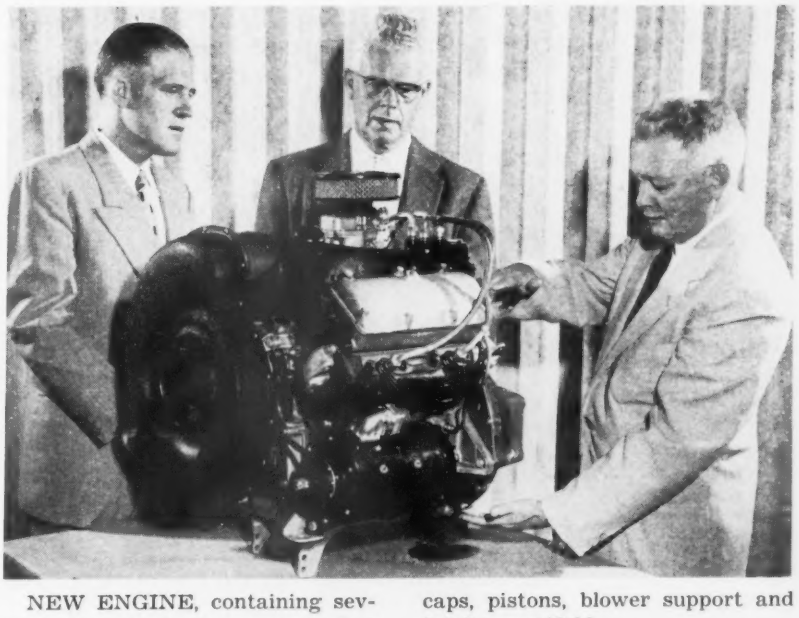
Metal Treating Institute, Rochelle, N. Y., reports that heat treating billings for the first six months of 1956 were $19,319,100. This figure compares with $14,997,000 for the 1955 period, an increase of 28.8 per cent.

Vanadium Corp. of America has moved its engineering department from Niagara Falls, N. Y., to new facilities at Cambridge, O. The move is designed to centralize all engineering and development in the new research center. H. C. Parkman, assistant vice president, has been assigned temporarily to a new post as assistant vice president in charge of engineering. Other appointments include R. A. Davidson, chief plant engineer; Floyd G. Fellows, power engineer; James R. Lee, design engineer, and Delmon H. Tammen, chief field engineer.

Pittsburgh Metals Purifying Co., Pittsburgh, producer of exothermic compounds and fluxes, has been purchased by Treesdale Laboratories & Textile Processing Inc., Mars, Pa. The company was acquired from the estate of the late Peter Soffel, who founded the company in 1928. As a subsidiary of Treesdale Laboratories, Pittsburgh Metals Purifying Co. will continue operations under the direction of C. A. Marlowe, general manager.

Alabama Pipe Co., Anniston, Ala., has closed its branch plant at Talladega, Ala. All the company's operations will be consolidated at a multimillion-dollar plant in Anniston.

Mesta Machine Co., Pittsburgh, has acquired ownership of the New Castle, Pa., foundry and machine shop



NEW ENGINE, containing several die-cast aluminum parts, has been developed co-operatively by American Motors Corp. and Aluminum Co. of America. Aluminum accounts for 70 lb of the 200-lb, 62-hp, V-4 engine shown above. It can be produced with two, four, six or eight cylinders, either V-type or horizontally opposed. All models are air-cooled.

The aluminum cylinders are designed for die casting and have chrome-plated bores. Assembly of individual cylinders to an aluminum die-cast crankcase provides the varying sizes of engines. Cylinder heads, cylinder covers and timing gear housings also are designed for die casting. Other aluminum parts include main bearing caps, pistons, blower support and intake manifold.

The V-4 has a displacement of 108 cu in., bore and stroke of 3.25 x 3.25 in. and compression ratio of 7.5 to 1. It uses a valve-in-head arrangement. The line of engines can be used for airborne military vehicles, in small passenger or commercial cars and for stationary power sources.

Shown above with the engine, left to right, are: George Romney, AMC president; Stuart G. Baits, vice president and general manager of the company's Special Products Division, and Meade F. Moore, vice president in charge of automotive research and engineering, who conceived the engine and worked on its development.

Now...from U.S.G.

the most complete line of materials for plastic tooling!

U.S.G. experience, technology and research set new standards for epoxy laminating and casting resins

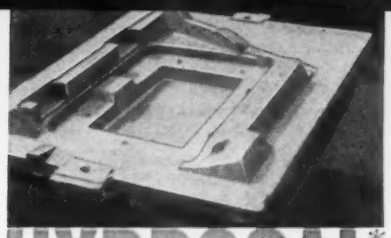
Now, you can do the entire job—from blueprint to finished pattern or tool—with materials from a single source, United States Gypsum. The addition of new EPOXICAL Tooling Plastic to the U.S.G. family of gypsum cements and plastics completes a line of materials for laminating and casting; makes U.S.G. an important part of the plastics industry.

Now, you're assured of unit responsibility; of quality materials that have been scientifically researched, thoroughly tested. A qualified U.S.G. technician will be happy to demonstrate how these U.S.G. materials can be applied to your plastic tooling problems.

FREE! Write United States Gypsum, Dept. 122, 300 West Adams St., Chicago 6, Ill. for this free literature: HYDROCAL Models and Molds (IGL-ITT-100); Vacuum Forming with ULTRACAL (IGL-ITT-55); EPOXICAL Laminating Resin (IGL-400); EPOXICAL Casting Resin (IGL-401).

USG UNITED STATES GYPSUM

UNITED STATES GYPSUM



HYDROCAL*

HYDROCAL gypsum cements are used for molds and original models to laminate or cast plastic patterns, dies, jigs, fixtures or foundry match plates and core boxes.

ULTRACAL*

ULTRACAL gypsum cements are used for vacuum forming models and molds. Offer high strength, improved heat resistance for prototype, short run and production applications.

NEW EPOXICAL*

NEW EPOXICAL tooling plastics permit laminating or casting of precise, economical epoxy resin patterns and models in half the time required by traditional techniques.

**HYDROCAL and ULTRACAL are trade marks Reg. U.S. Pat. Off. for super strength gypsum cement manufactured by United States Gypsum Company. EPOXICAL is a trade mark for epoxy resins manufactured by United States Gypsum Company.*

pioneering in ideas for industry

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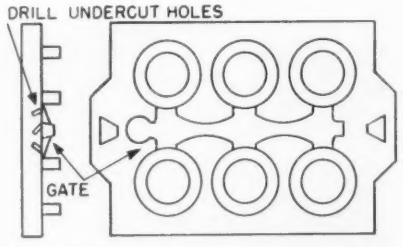
HOW TO DO IT

Modeling Clay Is Used To Develop Gating System on Matchplates

By S. J. PITRE JR.
New Orleans

HERE is a simple method for gating metal patterns. When a new pattern plate is received, build up a gating system with modeling clay directly on the plate. Dust well with parting and carefully ram up a mold. Lift off the mold and examine to be sure the gate has not been struck with rammer or distorted in any manner. Remove the modeling clay and clean the plate. Then drill a few undercut holes in the plate where the gating system will be.

Cut a sprue in the mold, replace mold over the pattern and pour with lead or white metal. When the mold is shaken away the gate can be peened snugly against the pattern and scraped smooth to give a long-lasting, satisfactory job.



Do you have any trick of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

formerly owned by the government. Some months ago Mesta submitted the high bid of $8 million for the plant, operated previously by United Engineering & Foundry Co., Pittsburgh, on a defense contract which expired Mar. 31, 1955.

New York Air Brake Co., has acquired Optical Film Engineering Co., Philadelphia. The purchase enables New York Air Brake to supply a broad line of high-vacuum systems and equipment, including high-vacuum furnaces for heat treating and melting operations, in addition to its present line of mechanical high-vacuum pumps. Optical Film Engineering will be operated as the Vacuum Equipment Division of New York Air Brake.

Shallway Corp., Connellsville, Pa., has established a Shell Mold Pattern Supplies Division which will carry a complete line of pattern accessories and supplies for shell mold patternmakers. The division will maintain its headquarters at the Shalco Demonstration Center, Connellsville. Overseas customers will be handled through Shallway International Corp., London, England.

Hyster Co., Portland, Oreg., plans to open a new manufacturing plant in Sao Paulo, Brazil, occupying an initial area of 40,000 sq ft. Supervisor of the Brazil facilities is Robert E. Lange. Kenneth E. Guptill will be sales manager, and Merrill A. Turner will head production.

P & R Tool Die Co., foundry and machine shop, 511 Wilder Building, Rochester, N. Y., has been granted a charter of incorporation listing 100 shares of capital stock, no par value. Directors are Francis M. Skivington, 19 Jersey St., Caledonia, N. Y.; John F. Skivington, 72 Orchard Drive, Rochester; and Rosemary Drees, 319 Barmont Drive, Rochester.

Thor Power Tool Co., Aurora, Ill., has begun construction of a new building to house its Indianapolis branch at 1489 North Harding St. The new branch is the company's 25th sales and service center. Thor also has moved its Milwaukee branch office to a new building, at 3911 West Greenfield Ave., which doubles the floor space available.

Fuller Co., Catasauqua, Pa., has acquired all assets of Lehigh Fan & Blower Co., Allentown, Pa. The business will be continued as the Lehigh Fan & Blower Division of Fuller Co. Fuller Co. is a wholly-owned subsidiary of General American Transportation Corp., Chicago.

Wedgeplug Valve Co., an affiliate of Stockham Valves & Fittings, has moved its entire operation from New Orleans to the Stockham plant in Birmingham. Its new address is 4000 Tenth Ave. North, P.O. Box 2592, Birmingham 2, Ala.

International Harvester Co.'s foundry at Waukesha, Wis., will be shut down for six weeks beginning Oct. 1. The layoff will affect about 300 production and maintenance workers.

Republic Steel Corp., Cleveland, has appointed Fred Hill & Son Co., Tenth and Cherry Sts., Philadelphia 7, to handle sale and distribution of Republic material handling equipment, including steel pallets, steel skids, steel boxes and steel box and skid combinations.

Marion Malleable Iron Works, Marion, Ind., is purchasing an electric annealing furnace with a capacity of 1000 tons per month. Installation of the furnace will permit heavier production of pearlitic malleable iron castings.

Clark Controller Co., Cleveland, has established engineering and manufacturing facilities in a new building at 4755 East 49th St., Los Angeles 58. A Los Angeles Division of the firm has been set up which will include the former Los Angeles district sales office as well as the new engineering and manufacturing departments.

Arwood Precision Casting Corp., New York City, has extended production facilities in its plants at Brooklyn, N. Y., Groton, Conn., Tilton, N. H., and Los Angeles to include finish machining of castings to customer specifications. This step is the latest in a multimillion dollar expansion program.

L. P. Best Co., Washington, has been appointed representative for the Ohio Hoist & Mfg. Co., Lisbon, O., and Alcaloy Inc., Trenton, N. J. The latter two companies are part of Dickey Industries, Cleveland.

Houston Foundry & Machine Co., 2205 White, Houston, Tex., has been purchased by Horth, LaMaster Lacey Inc., and Charles M. Horth has been named president.

Look for Tru-Steel in yellow-striped bag

NOW IN 50 LB. BAGS

He has to see for himself!

When it comes to blast cleaning, a foundryman can't believe claims and promises. He has to see for himself the kind of finishing job an abrasive does. His next question is: What does it cost in operation? Different jobs may require different abrasives but the result should always be the same—the best job at *lowest* cost. Malleabrasive and Tru-Steel abrasives give you that. Whichever you need, Pangborn has the right abrasive for your job. Talk to one of our sales engineers, or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Maryland.

Pangborn DISTRIBUTORS FOR

MALLEABRASIVE® AND

TRU-STEEL SHOT

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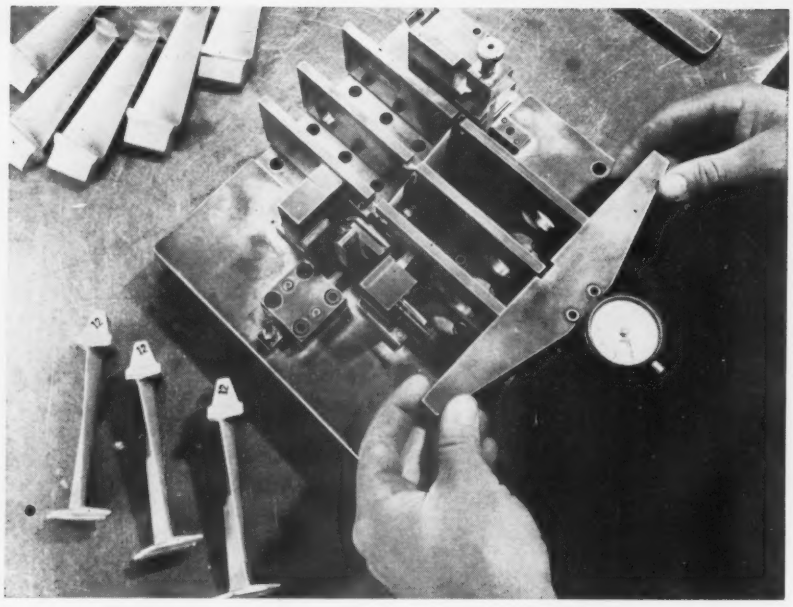
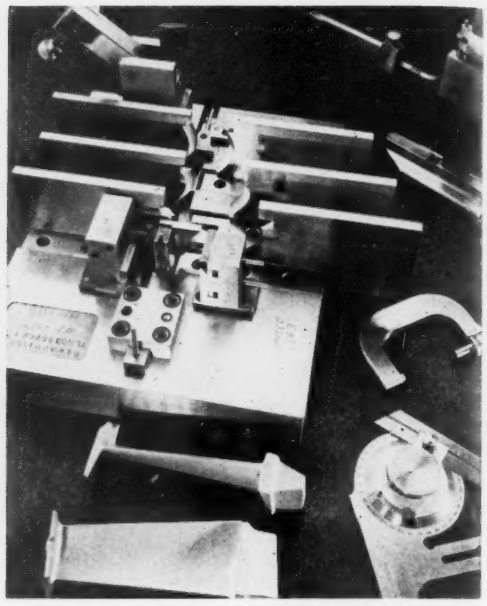


Gaging equipment in production inspection requires continual, scheduled surveillance system



New equipment requires a complete layout inspection and comparator evaluation

GAGE CONTROL

for Investment Castings

By JOHN E. INGALLS
Misco Precision Casting Co.
Whitehall, Mich.

THE increasing demand for dimensionally accurate castings of complex and intricate shapes, as fostered by the jet aircraft engine program, has created a highly specialized function of design and gage control in precision investment casting. This control is of particular importance in the production of high-alloy turbine blades and vanes, parts which must fall within very close tolerance bands on airfoil sections. The nature of the process, and its continual striving for closer dimensional control, necessitates an expanding gage program.

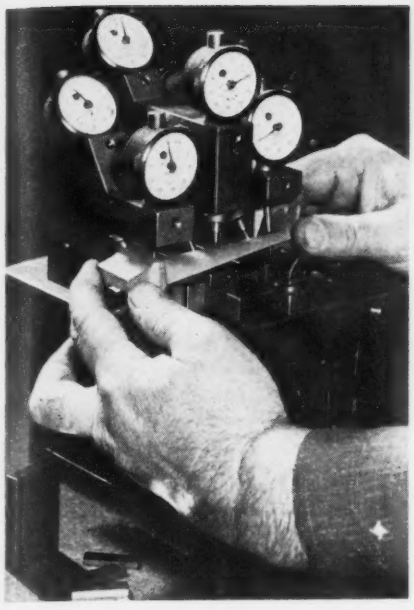
Precision investment cast parts of the airfoil type, used widely in jet engines, have tolerance requirements dependent on as-cast surfaces that are not machined or finished, except for polishing operations. Even machined areas of the castings are held to definite limits to assure a minimum of material removal to facilitate finishing operations. Machining stock allowances often are held to plus or minus 0.010-in. and nonmachined areas to as close as 0.005-in. These are not the dimensional limits of the process, but are nearer the optimum between production expediency and dimensional rejection.

Qualification of production parts through a series of dimensional checks has been shared mutually by both vendor and customer, the vendor interested primarily in duplicating or equalling the customer requirements to assure a quality product. As a result, the consumer of the product has in the past been most influential in the choice of inspection equipment. The several engine manufacturers are not entirely in agreement, however as to what constitutes a satisfactory qualification of a cast airfoil shape.

Because of this, several definite channels are being followed, among them the mechanical or guillotine-type gage, electronic recording devices using electrical amplification, gages depending on dial indicators and mechanical linkages, air-type gages and various combinations of these units. Each type has characteristic advantages as well as definite limitations, and it would be difficult to say that one type or another is the answer to all the gaging problems connected with cast turbine blades. Mechanical type gages are the most commonly accepted and, therefore, are subject to the most attention from a gage control standpoint.

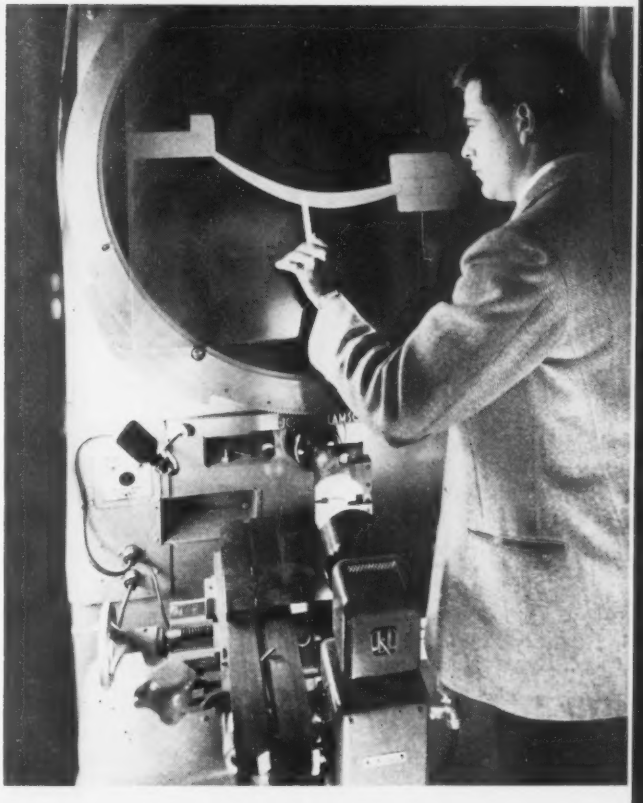
The organization of a formal gage control system becomes a necessity when production requirements for any one airfoil type casting requiring gaging exceeds 1000 pieces or more per month. This system should include scheduled surveillances, preventive maintenance, periodic toolroom inspection and a complete biography of each gage. Gages processing a smaller monthly number or those used during relatively short or intermediate terms can be inspected after arbitrary time intervals, perferably not over 90 days.

Gage Design and Procurement—A gage control program should begin with the design and procurement of the gaging. With the establishment of dimensional quality levels, the casting vendor and the customer must arrive at an equitable method



Final acceptance of a gage should include part tryout

Daily part totals are posted on a surveillance schedule which is based on pieces run



Inspector is checking guillotine templates for wear. He is using an overlay chart in an optical comparator

Layout inspection is made to check the dimensional functions of a guillotine gage

of inspection procedure. Agreement on design and interpretation precedes actual procurement of the equipment. Should the vendor design his own gages, they must duplicate the requirements of the customer's receiving inspection. It often is mutually advantageous for the vendor to design his own equipment, for the problems differ considerably between receiving inspection by the customer and shipping inspection by the vendor.

Primarily, the customer's inspection is concerned with accepting or rejecting the casting according to its compliance to the gage's standards. The vendor, on the other hand, must qualify the casting to the gage. Actual physical changes often are brought to bear by straightening, twisting and stock removal. Before a casting is accepted, it may be in and out of some of the gages several times. This type of production gaging tends to accelerate wear and requires an expanding surveillance program. Gages used by the vendor must be rapid and positive and have a minimum number of wear points.

Procurement of the equipment by the casting vendor requires close liaison between the gage control group and the gage source, contingent on the individual company's purchasing policy. Gage manufacture for airfoil equipment is a highly specialized branch of the gage industry, particularly in the guillotine field. Experience in the grinding of airfoil templates should be a prereq-

FAST

FOR LIFTS IN "ALL CLEAR" AREAS

SLOW

FOR "CREEPING" WITH FRAGILE LOADS

Setting cores, drawing patterns and closing flasks require "gentle" treatment — slow action that prevents damage and spoilage. Fast hoisting saves when castings are handled at shakeouts and tumbling barrels. Both speeds are provided by the Series "700" 'Load Lifter' Electric Hoist at the push of a button. "High" is 3 times faster than "low" — a ton can be lifted a foot in 2 seconds or in 6 seconds.

Performance like this is only one reason why foundrymen like the Two-Speed Series "700" 'Load Lifter' Electric Hoist. Quality throughout assures them of complete safety. Two automatic brakes assure double protection while giving them the fast, smooth starts and stops essential for accurate load control.

Put the efficiency and economy of the Two-Speed Series "700" 'Load Lifter' Electric Hoist into your operations. All types of suspension available, including motorized trolley. Capacities: ½ ton and up. *Get details about this tough, powerful hoist from your "Shaw-Box" Distributor or write us for Bulletin 410.*

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

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uisite for consideration as a gage source, as well as quality, delivery and price. Most of the gage manufacturers familiar with this work are located in the Detroit and Cleveland areas.

Gage Records—The importance of concise, up-to-date records for each gage cannot be overstressed. Permanent records for each should include the initial receiving layout report, a complete history, surveillance reports and any correspondence or information pertaining to reoperations, unusual circumstances, engineering changes and the like. A satisfactory method of recording the gage history can be instituted through use of a large card file. An arbitrary number is assigned to each gage and used as a reference throughout the entire use of the equipment. These numbers should be nontransferable, etched permanently on the gage.

Information recorded should include reference number, job number, customer, part name, number and engineering change, tool name and number and the dates. The source and source serial number, as well as purchase order or invoice data, facilitate correspondence regarding the gage or future transactions. Any special information, such as use as a master gage, must be included. Systems of cross-reference to the file aid in immediate location of any desired information contained on the card.

Gage Surveillance — Perhaps the most important aspect of a gage control program is the surveillances or inspections of the equipment. To guarantee the accuracy and ability of all gages to perform satisfactorily, both on the job and in special instances, constant inspection and layout are required. The most complete and exacting layout usually is receiving inspection.

Included in this class of surveillances should be optical comparator inspection of all contours of guillotine slides, targets and outline templates; complete layout inspection of all gage components, in accordance with the reference construction dimensions; complete layout of all contact points, flush pins and steps and dimensional functions of the gage; complete layout of detail part dimensions, locations and construction features; inspection of construction, condition, mechanical movements, accessories, manufactured components, adjustment and general appearance of the gage; acceptance of the ability of the gage to perform its designated function through the initial tryout of parts to be inspected; and, finally, verification of markings as to tool

Produce More
Top Quality
Castings
with
Top Quality
FOUNDRY MATERIALS

Use these Time-Tested Products for Best Results

SAND
Portage (Wis.) Silica
Century Molding
*Ottawa Blackhawk Silica
Muskegon Lake Sand
Tenn. & Ind. Molding
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*Zircon Sand, Flour and Wash
Berlin Core Sand
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New Jersey Molding
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Albany Molding

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*and Panther Creek Bentonite
*Goose Lake Fire Clay
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*Malleabrasive Shot and Grit
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number, part number, engineering change, source, tolerances or settings and the identification number.

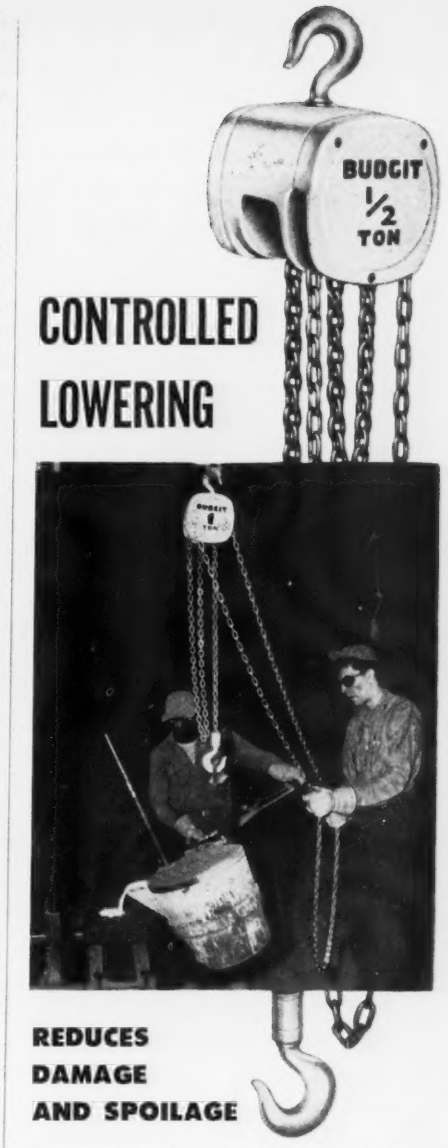
Scheduled surveillances will center on details of the gage subjected to wear or adjustment. Completeness of the inspection depends of course, on the use of the gage. Generally, scheduled periodic surveillances should include layout inspection of functional components, in accordance with reference construction dimensions; layout inspection of all gage points, locators, flush pins and steps and dimensional functions of the gage; and inspection of the condition, mechanical movements, accessories, manufactured components, adjustment and appearance of the gage. Optical comparator inspection of gage contours usually is not necessary each time a gage is checked out. An intermediate class of surveillance including optical comparator inspection should be performed after a given number of the gage function inspections. How often the intermediate class of inspection is necessary depends on the presence of wear and use of the gage.

Adjustment Must Be Authorized

Following a surveillance, a gage may require adjustment or alignment, such as the location of indicating devices, contact travel, guillotine slide travel or alignment and compensation for wear. A clearcut policy must be established as to who will authorize and perform the adjustments as required. Absolutely no adjustments should be undertaken by unauthorized personnel, even though they appear minor at the outset.

No deviations from specified blueprint tolerance should be allowed on either new or reoperated equipment. Deviations from specified tolerances through normal wear from use should be tolerated only so long as they do not affect the designated dimensional functions of the gage. The responsibility for accepting or rejecting a gage deviating from normal should be undertaken on a level cognizant with eventual part inspection procedures.

Surveillance Scheduling — Several satisfactory methods of scheduling surveillances can be established, contingent on the individual manufacturer's requirements. One company might want to base its surveillance program on a time-elapsed system. A card file with certain gages falling due on specific dates would enable the layout group to schedule the various class surveillances as they came up. A system of this type lends itself to an operation running at a constant rate of production. It also



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Circle 654 on Inquiry Card—Page 245

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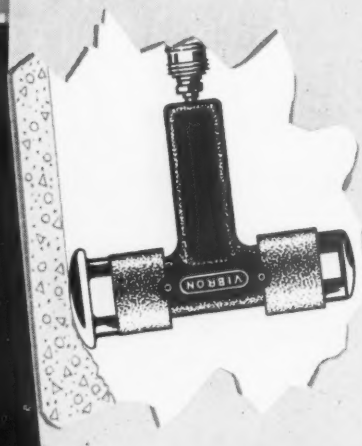

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Circle 655 on Inquiry Card—Page 245

facilitates planning on the availability of gaging capacity. Another casting vendor might find that surveillances scheduled by number of pieces processed comprise the most convenient plan. This plan entails a daily tabulation of total pieces, transcribed from the operator's time sheet or the department's production log. Parts processed as a basis for surveillance are particularly well adapted for jobs running on varying or interrupted production schedules. Various combinations or alternate systems can be enlarged upon, although the important point on surveillance scheduling is that once a system is put into effect, it should be adhered to.

Upon completion and acceptance of a gage by layout, some means of identifying the surveillance should be affixed to the gage. A pressure-sensitive tag, placed in a protected spot, with the date and class of the surveillance is sufficient in most instances. Permanent records of the surveillances and adjustment of the surveillance schedule follow and give a concise picture of an entire gage program, if properly maintained.

Surveillance Frequency Varies

Frequency of surveillances must be established from experience, in most cases depending on the amount of wear or error that develops through the use of the gage. Most alloys used in the manufacture of turbine components are inherently hard and abrasive. Production gages often are located in areas subject to abrasive dust, and the parts themselves may transport small amounts of cleaning operation grit, furthering rapid wearing of locating and operating details. The combination of these factors and general gage depreciation tends to increase the frequency of surveillances per number of pieces run as part requirements go up. As a general rule, maximums of 5000 pieces processed between dimensional surveillances and of 20,000 pieces processed per intermediate surveillance provide control of dimensional discrepancies. Unusual operating circumstances or gage design subject to extremes of wear materially reduce the number of parts which can be processed safely without layout inspection.

If at any time doubt exists as to the accuracy of a gage's performance, a nonscheduled surveillance should be performed. Nonscheduled surveillances should be to a classification in keeping with the severity of the alleged error. Departmental supervisory personnel should request such action, and disposition of the layout

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classification should remain with the gage control staff. The success of any dimensional control program depends not only on accuracy of the equipment inspected, but also on the confidence of operating personnel. It is important to instill a feeling of respect for the ability of equipment to inspect accurately and consistently.

Maintenance & Repair—Maintenance and repair of gages when there are discrepancies due to wear and normal depreciation usually can be accomplished at the layout level. Repairs of this nature include replacement of contact points, adjustment of component travel, alignment and adjustment of slides and other repair which does not require toolroom facilities. A stock of common replacement parts expedites return of gages to production.

The procedure for obtaining major repairs necessitated by severe wear or breakage depends largely on the facilities available. Most toolrooms are capable of machining and grinding operations on plane dimensions, but re-establishing airfoil contour shapes should, in most instances, be left to a gage vendor familiar with that type of work. Repairs on customer-supplied gages should be referred to them for their consideration and approval before being undertaken. A firm policy on repair and maintenance, as well as on engineering change reoperation of gages, will, of course, depend on arrangements and scope of the vendor-customer procurement agreements.

The condition of gages assigned to a department should remain the supervisory personnel's responsibility. Gages must be kept free from rust, abrasives, corrosives and hard or sharp objects that might nick or otherwise affect them adversely. Adequate storage should be available, accessible only to authorized personnel. Before a gage is returned to storage, it should be cleaned and protected from rust. Authorized personnel should ascertain that a gage is operating properly when issued to or returned by the operator.

It is the individual operator's responsibility to operate a gage in the prescribed manner, as instructed by his supervisor. He should see that the equipment is kept clean at all times and returned in the same condition in which it was received. The operator must report immediately any unusual circumstance and if at any time he doubts the adjustment or accuracy, he must bring the matter to the attention of his superior. Periodic accuracy checks should be made by the supervisor throughout each working day.

Here's a useful cupola addition for your foundry—

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OXYGEN...SULPHUR...NITROGEN...

All the benefits of adding zirconium to cast iron are now available to the foundry in the form of "EM" zirconium briquets. When added to the cupola, zirconium briquets perform several important functions vital to the production of high-quality cast iron.

Zirconium is one of the most powerful deoxidizers that can be added to molten iron and has a strong affinity for sulphur, uniting to form sulphides in a manner similar to manganese. Zirconium also combines with nitrogen to form nitrides, most of which pass off in the slag.

When added in proper amounts, zirconium acts as a graphitizing element in cast iron. Increases in the fluidity of iron have also been reported when "EM" zirconium briquets were added to the charge.

"EM" zirconium briquets offer an accurate, efficient, and economical means of adding zirconium to the cupola. Each briquet, cylindrical in shape and reddish brown in color, contains 1.90 pounds of silicon and 0.55 pounds of zirconium. Since each briquet contains a definite weight of zirconium, any desired number of pounds can be added to the charge by simply counting the number of briquets. Weighing is thus eliminated.

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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

VERSATILITY of the investment casting process was illustrated strikingly by an unusual job done recently at Investment Casting Co., Springfield, N. J.

The firm was called upon to aid in the construction of a test dummy by producing the cervical vertebrae. These castings were to establish proper neck articulation and responses in the dummy, which is used

in automotive safety research. Known as Mark III, the dummy provides physical data about what happens to the human body in crashes and other circumstances too dangerous for human participation.

According to exact medical specifications, perfect replicas of the cervical vertabrae were produced and joined in a modified ball and socket relationship. Motion is controlled by means of a boss projecting from the hemispherical top surface of one casting and fitting into a radial slot on the underside of the mating casting.

Investment Casting Co. also produces castings by the shell molding process.

Has Good Conductivity

RESEARCH for Nippert Electric Products Co., Columbus, O., by technologists of Battelle Memorial Institute has resulted in development of a copper-zirconium alloy possessing high electrical conductivity and good strength retention at elevated temperatures. The alloy, containing 0.25 per cent Zr, is suitable for electric motor commutators serving at temperatures above 500°F and under conditions where strength is required. It has an electrical conductivity of 95.8 per cent of that of the copper standard. Other properties include machinability comparable to various copper-silver alloys, ability to develop and maintain a commutator film, and strength increase with notching.

For Elevated Temperature

WITH operating temperatures of steam turbines seemingly headed for 1200°F in the next few years, a new nickel-cobalt alloy developed recently by Westinghouse Research Laboratory engineers should prove useful. It is claimed to have properties at 1200°F similar to those of 12 per cent Cr steel at 900°. Its 100-hr creep-rupture life is said to be of the order of 50,000 psi at 1200°, and its damping capacity about ten times that of similar alloys. It is reported to be nearly five times as strong as 12 per cent Cr steels. Excellent damping capacity of the new alloy is said to be the result of control of its magnetic structure.

Stress Relieving Data

FROM some tests conducted on unalloyed gray irons with minimum tensile strengths of 25,000, 35,000 and 50,000 psi, it was found that the tensile strength and hardness of the 50,000 and 35,000 psi irons were not altered significantly by stress relieving at 1150 to 1200°F. However, stress relieving at that temperature range significantly reduced both tensile strength and hardness of the 25,-000-psi iron. The 25,000-psi iron can be stress relieved at 1000°F without any significant change in the tensile strength and hardness.

Forms Notch Effect

ACCORDING to a paper, "Effect of Brittle Skins on the Ductility of Metals," by G. W. Form and W. M. Baldwin Jr., which was presented at the recent annual meeting of ASTM, brittle skins (for example carburized cases) embrittle an otherwise ductile metal to a greater degree than would be anticipated by the percentage of bulk that the skin occupies. Evidence is offered to show that in tension tests on metals with brittle skins, the skin cracks at a negligible strain and that from this point on the test is merely a notch tension test of the core. This evidence points out among other things that notch-sensitive steels are ill-suited for carburizing purposes.

Withstands High Temperature

MOLYBDENUM-base alloys with greater structural strength at higher temperature than existing commercial materials have been developed in a six-year Navy-sponsored project at Climax Molybdenum Co., according to A. J. Herzig, vice president of research. Four alloys which can be fabricated on normal tool-steel mill equipment are now commercially available as a result of the work, and include 0.3 Cb-Mo, 0.5 Ti-Mo, 1.0 V-Mo, and 2.0 W-Mo. Outstanding property of the new alloys is their strength above 1600°F.

Improves Impact Properties

USE of higher carbon contents (0.12 to 0.19 per cent), the addition of nitride and carbide-forming elements (aluminum, vanadium and titanium), and austenitizing at lower temperatures to achieve finer grain size and minimize intergranular carbide precipitation during subsequent tempering, were found to improve the impact properties of 12 per cent chromium steels. This is reported in a paper, "Effect of Composition and Heat Treatment on Impact properties of AISI Types 403 and 410 Stainless Steels," by E. J. Whittenberger, E. R. Rosenow and D. J. Carney which was presented at the recent annual meeting of ASTM.

Good Suggestion Pays Off

FOUNDRY pattern department employee, Walter Mikulitz of Ford Cleveland Foundry, has received $1356 under the plant's employee suggestion plan. It is the highest award since the plan was started.

His suggestion was to use seamless steel tubing in a straight reamed hole as bushings to back up the blow tips in the upper half of core boxes. With seamless tubing, blow bushings could be made more rapidly from material stocked in lengths and cut to suit when needed. Rebushing also is accomplished more easily by use of the seamless tubing.

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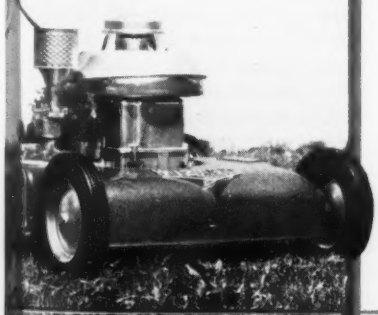

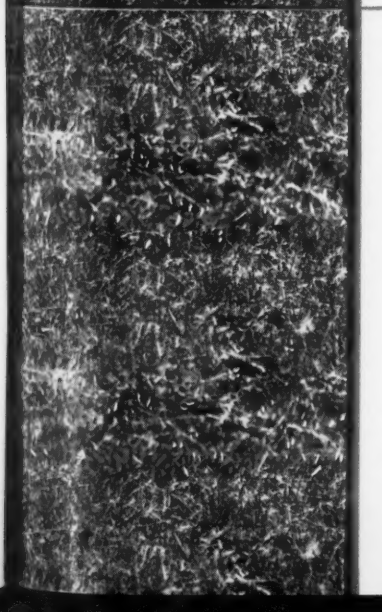

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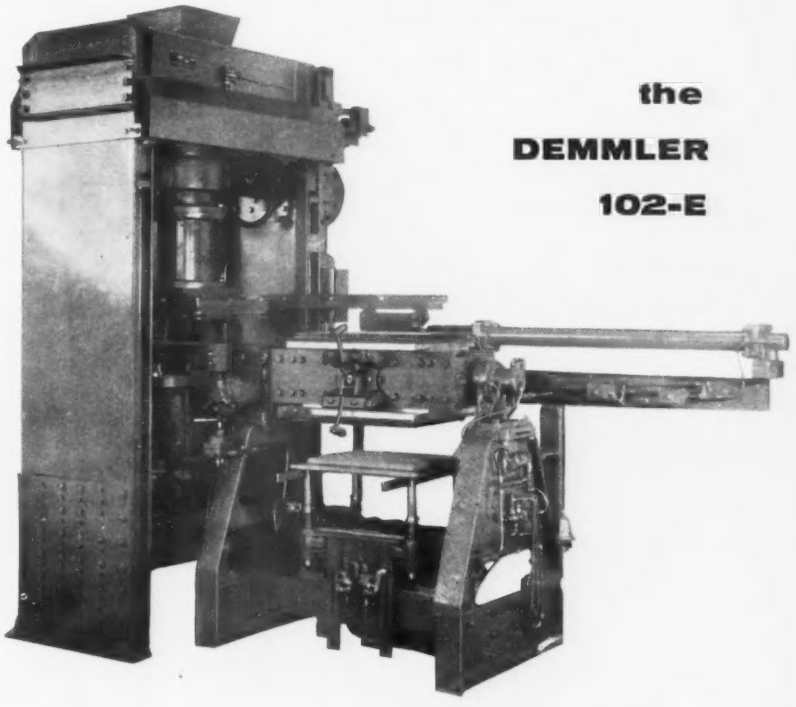

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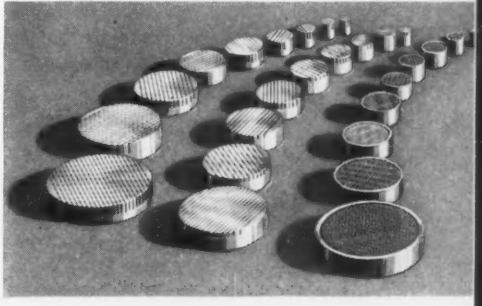

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Circle 660 on Inquiry Card—Page 245

Government Studies Wider Use of

AIRCRAFT CASTINGS

Report to the Department of Defense points out obstacles which have limited use of aircraft castings. Recommended is a government-sponsored program to establish acceptability of steel castings and to determine best production methods

IN July, 1955, the office of the Assistant Secretary of Defense for Research and Development requested the Materials Advisory Board to survey the field of high-strength precision casting techniques. The board was to ascertain whether research could promise to develop methods of producing more widely usable aircraft castings, particularly of steel.

Preliminary studies indicated that cast steel components of primary airframes showed the greatest potential for wider use. Technical experts of the steel foundry industry, the airframe industry and independent research organizations were invited to form a panel to study the problem and make recommendations.

Members of this group, called the Panel on Precision Aircraft Castings, included the following: Clarence E. Sims, Battelle Memorial Institute, chairman; Charles W. Briggs, Steel Founders' Society; Walter Dunn, Pacific Alloy Engineering Corp.; Prof. Nicholas J. Grant, Massachusetts Institute of Technology; A. J. Kullas, Glenn L. Martin Aircraft Co.; L. H. McCreery, Chance Vought Aircraft Inc.; F. A. Monahan (alternate for T. E. Piper), Consolidated Vultee Aircraft Corp.; A. H. Petersen, Lockheed Aircraft Corp.; H. D. Phillips, Adirondack Foundries & Steel Inc.; and Leo Schapiro, Douglas Aircraft Co.

Liaison representatives included Jess Belser, Watertown Arsenal; John Forry, Office of Aircraft and Marine Craft; Lt. Col. L. W. Herway, U. S. Air Force; T. F. Kearns, Bureau of Aeronautics, Dept. of the Navy; Col. H. G. Macdonald, Air Materiel Command; R. R. Kennedy, Wright Air Development Center; A. H. Langenheim, Air Materiel Command; William Pellini, Naval Research Laboratory; and Roy W. Tindula, Business and Defense Services Administration, Department of Commerce.

The panel has completed its survey, and its report has been made available to the public by the Office of Technical Services, U. S. Dept. of Commerce (PB 121148, $1.75, Washington 25, D. C.).

In an analysis of the present situation, the report states that present use of steel castings in aircraft is very limited, quantitatively. A few large sand castings are used as auxiliary structural parts. "Precision" castings from 8 to 30 lb, produced principally by the shell molding, Ceramicast (or Shaw) and investment processes, have important special applications in modern jet engines and as auxiliary parts of airframes. Many investment castings under 2 lb are used for accessories, plumbing and hardware components.

This situation exists in spite of the fact that steel castings were used in primary aircraft structures during World War II. Rejection rates were so high, however, that castings were abandoned after the wartime emergency. At present, no steel castings are used as structural components of airframes. Many aircraft manufacturers, however, foresee considerable saving of time and manpower through use of "precision" steel castings with 180,000 to 200,000-psi ultimate strength at normal temperatures—providing that reliability of quality can be achieved.

Present Techniques Suffice — The few foundries now producing steel aircraft castings feel that generally sound castings which will not fail in service can be produced by present techniques. They concede that many inferior castings have been delivered on production lot orders from aircraft builders, but claim that testing procedures now required are unreal-

istic. Usable castings often are rejected because of minor irregularities with no effect on essential mechanical properties.

Because of past experiences with widely varying, unsatisfactory lots of castings, aircraft manufacturers generally hesitate to use steel castings in critical applications for fear of their failing, the report states. In addition, current aircraft specifications provide lower allowable design strengths for steel castings as compared with wrought products than actually can be achieved. In spite of the many excellent steel castings that have been made, it is contended that the poor quality of many production lots of castings in the past has led many aircraft engineers to believe that foundrymen do not know enough about the basic factors governing shrinkage, porosity, hot tears, etc., to make consistently sound castings.

Foundry representatives maintain that although they still have much to learn regarding the best casting techniques, a lack of basic knowledge does not exist. They point out that only the highest skills and best practices can produce aircraft quality castings. The quality required by most foundry customers is not adequate to meet the demands of the aircraft industry. In addition, orders for aircraft castings generally are small and infrequent and frequently call for a short delivery time, with competitive bidding. These circumstances do not encourage a foundry to set up special practices, train special personnel and use the different standards of control required for these castings.

Other Obstacles—Price and design are further obstacles. Most aircraft makers select casting sources on a price basis, but castings of the quality they demand can cost many times as much as commercial castings of similar size. Designs often are intricate and need much developmental work before they can be produced at all, yet these designs are fixed by aircraft makers and patterns made and submitted to foundries. Unsound design often leads to unsound castings. Many foundries feel that the aircraft people are not interested seriously in using castings, and the foundries in turn are not particularly interested in aircraft business.

Summing up the present situation, the report states as follows: "This (situation) has created an impasse. The lack of confidence in castings which has developed in aircraft people from past experience and the present discriminatory specifications tend to rule out steel castings from aircraft structures. On the other hand, the past procurement practices tend to rule out proper development of aircraft quality castings;

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Established 1890
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it is this impasse which must be opened up before any notable progress can be achieved. Once this barrier has been eliminated, progress should be rapid."

The panel suggests the following measures to overcome obstacles to wider acceptance of steel castings as reliable aircraft components:

1. It must be proved that steel castings which meet needed strength-weight requirements and are of consistently high quality can be made in production quantities. 2. Comprehensive and realistic quality standards and applicable specifications for quality desired must be established. 3. Acceptable testing procedures must be developed. 4. Designers and founders must recognize each other's problems and work in close cooperation.

Recommendations—Conclusions and recommendations of the panel include these points:

1. Present activities are insufficient and uncoordinated and will not provide the data and mutual understanding necessary to lead to wider use of precision steel castings in aircraft.

2. Further development must be done with full co-operation between aircraft builders and foundries.

3. The government should sponsor and subsidize a broad and flexible developmental program aimed at establishing the acceptability of steel castings for aircraft use and of determining the best methods for production of steel castings of consistently high quality. An estimated $1 to $1¼ million expenditure by the government annually for several years would be required for the type of program recommended.

4. Basic investigations, particularly relating to foundry controls and techniques, mold materials and casting alloys, should be continued, broadened and accelerated. These projects are estimated to require an expenditure of about $200,000 to $300,000 annually for three to four years.

5. New and comprehensive quality standards must be developed.

6. A co-ordinating or steering body should be established to furnish advice and to monitor progress on these various research and development projects, including evaluation and testing phases.

The report also contains a number of appendixes which include a brief review of "precision" casting processes and comparisons of aircraft use of castings and forgings.

SAE To Combine Air and Auto Standard Drafting Practices

The Society of Automotive Engineers will undertake to produce and publish a drafting manual combining the best and most widely accepted drafting practices in the aeronautical and automotive industries. Practices established by the combined manual are expected to be important factors in the preparation of military drafting standards and in publication of an American Drafting Standard Manual by the American Standards Association.

Projects on the SAE Joint Aero-Auto Drawing Standards Committee agenda include the following: 1. Improvement of geometric and positional tolerancing standards. 2. Simplification of drafting practices. 3. Investigation of the trend to eliminate specifying how to process a product on engineering drawing. 4. Encouragement in the use of decimal dimensioning. 5. Standardization in the method of specifying screw threads. 6. Development of new drafting techniques for use in preparing drawings intended to be reduced in size. 7. Development of a standard method to specify on engineering drawings how to control free state variations in the shape of sheet metal parts.

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Make this *free* test—yourself! Simply tell us the size and quantities of sand strainer cores you now use—or send samples, and we will send you free Porite ceramic cores, from our large stock of standard sizes. Write today! Special sizes made on order to fit specific requirements.

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62 years

Porcelain Products, Inc.

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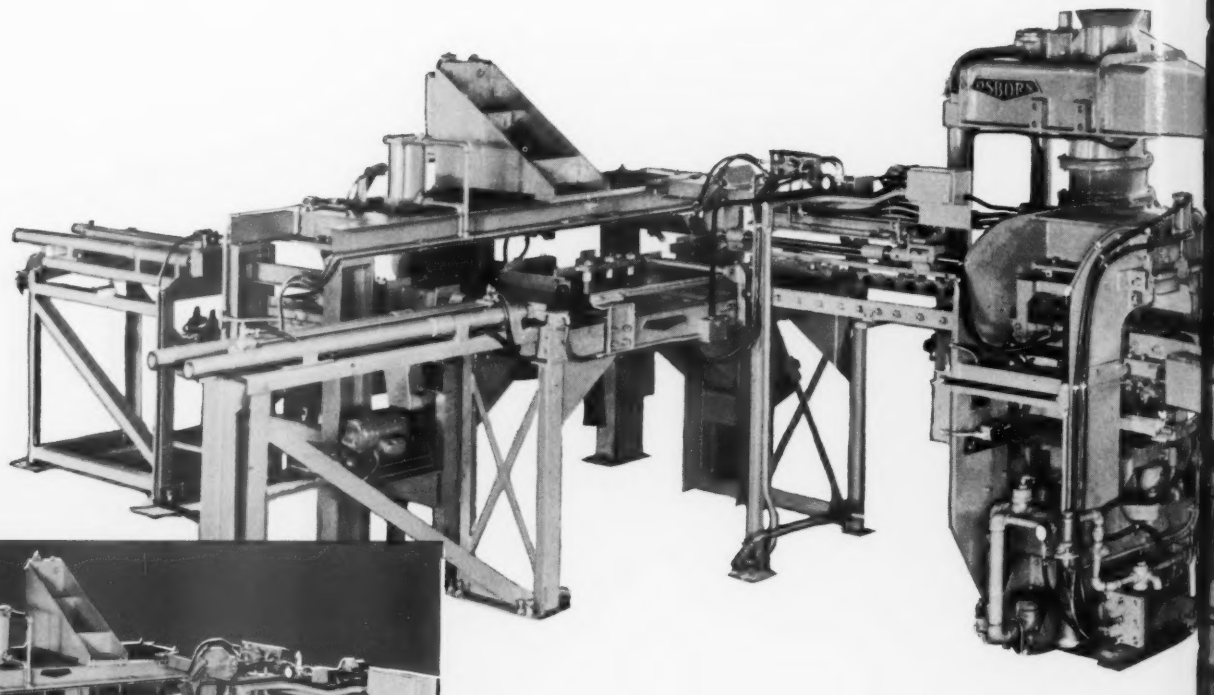
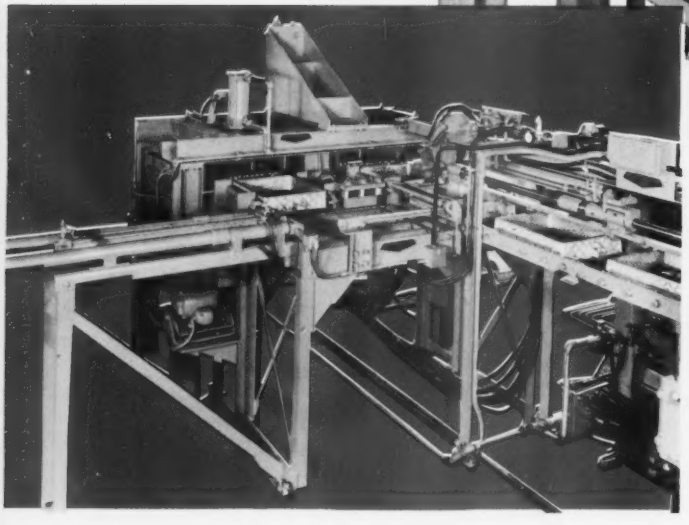
PP —INC.—

Circle 662 on Inquiry Card—Page 245

NEW foundry production system
by OSBORN

Osborn's foundry production machinery offers unequalled dependability..production..flexibility

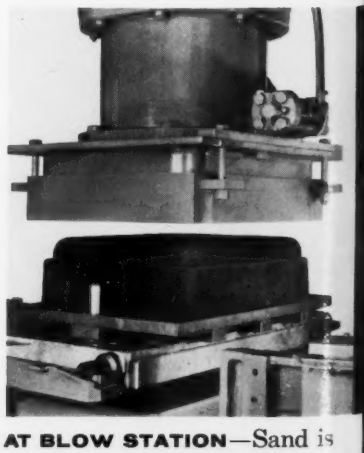




shakeout and flask return machine

Molds transferred from mold conveyor. Sand and castings removed. Empty flasks automatically returned to Mol-Dex Machine.

mol-dex machine

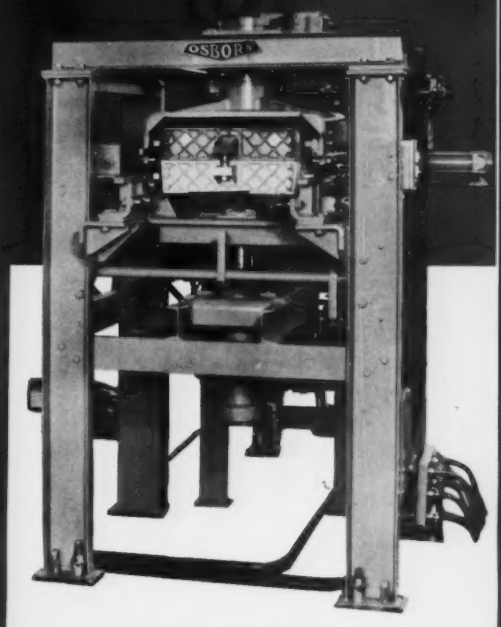


AT BLOW STATION—Sand is blown into preform cavity.

Short-run and mass-production foundries alike can now profit from Osborn's completely integrated, fully automated foundry production system.

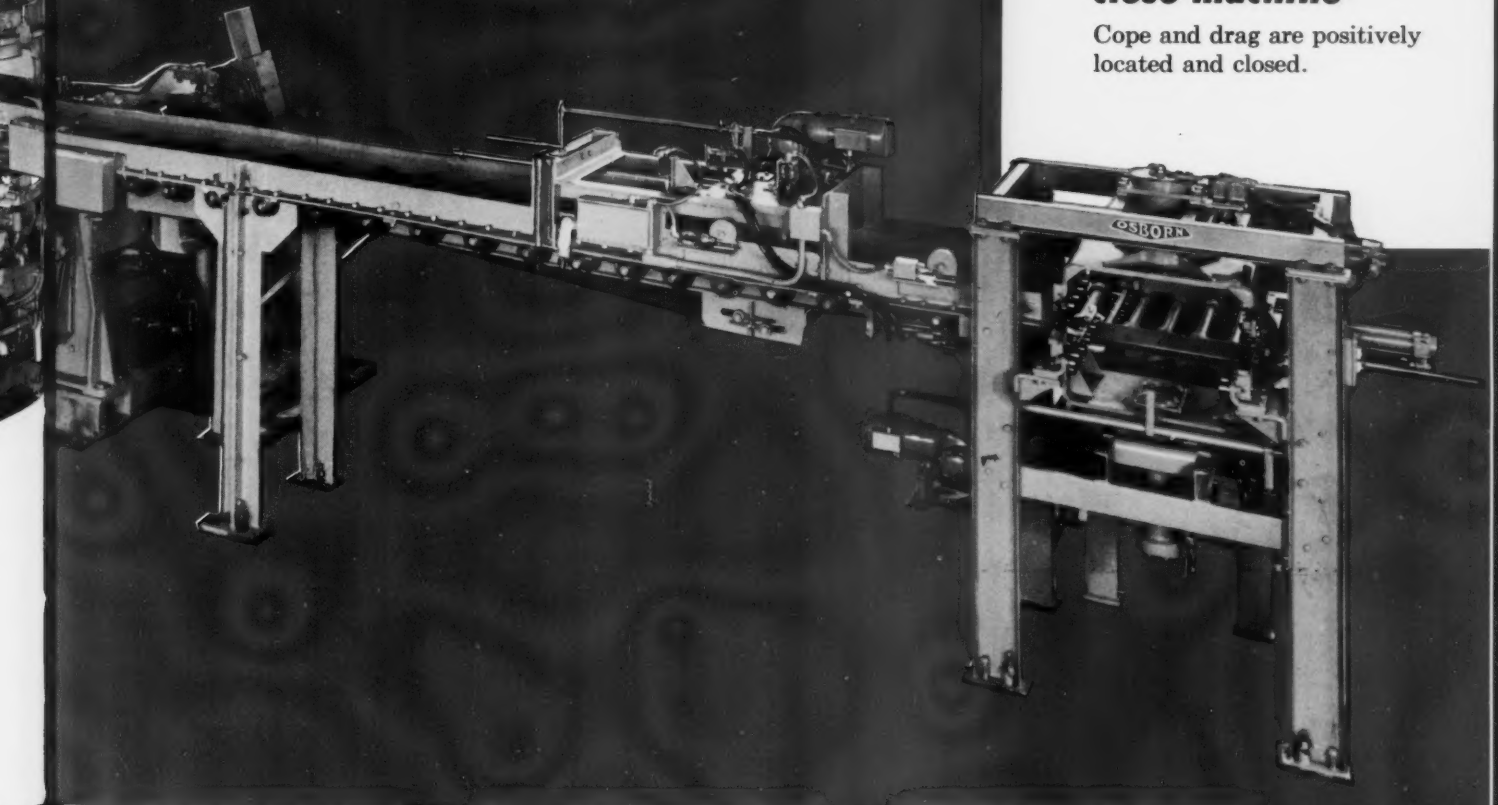
Combined with Osborn's Mol-Dex machine, new automatic close, shakeout and flask return machines—automatic transfer conveyors—assure a dependable, continuous flow of precision-formed castings. Floating platen on the Mol-Dex completely eliminates downtime for pattern changes by permitting changes between cycles.

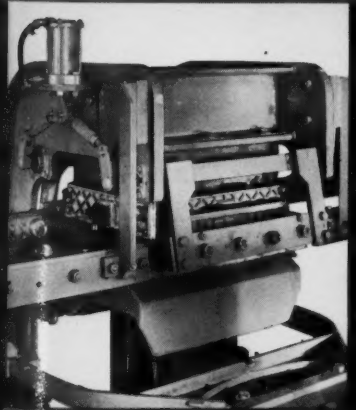
This new foundry production system is another of the many advancements you can expect from the leader . . . OSBORN. For complete details write, THE OSBORN MANUFACTURING COMPANY, 5401 HAMILTON AVENUE, CLEVELAND 14, OHIO.



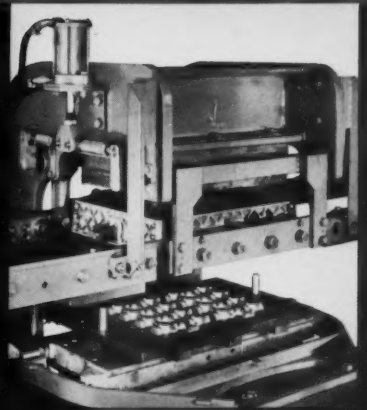
close machine

Cope and drag are positively located and closed.

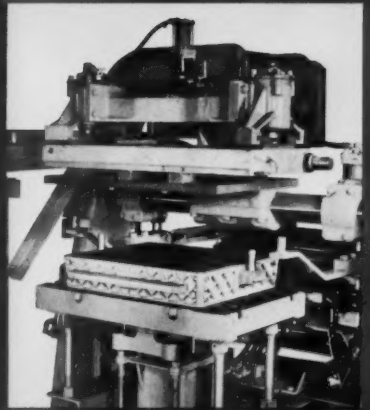




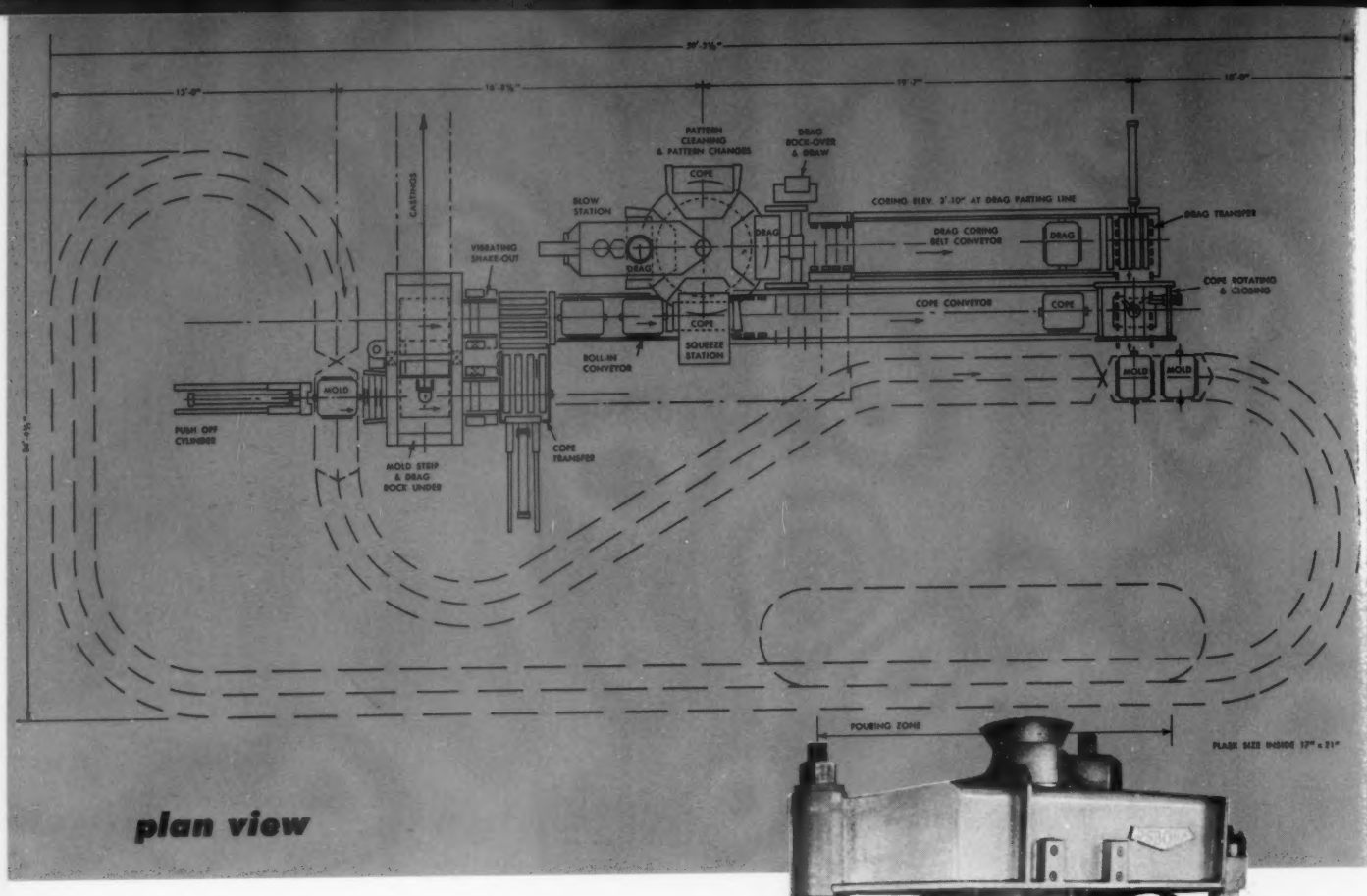
FLASK LOAD AND SQUEEZE STATION—Preform raised and squeezed into flask.



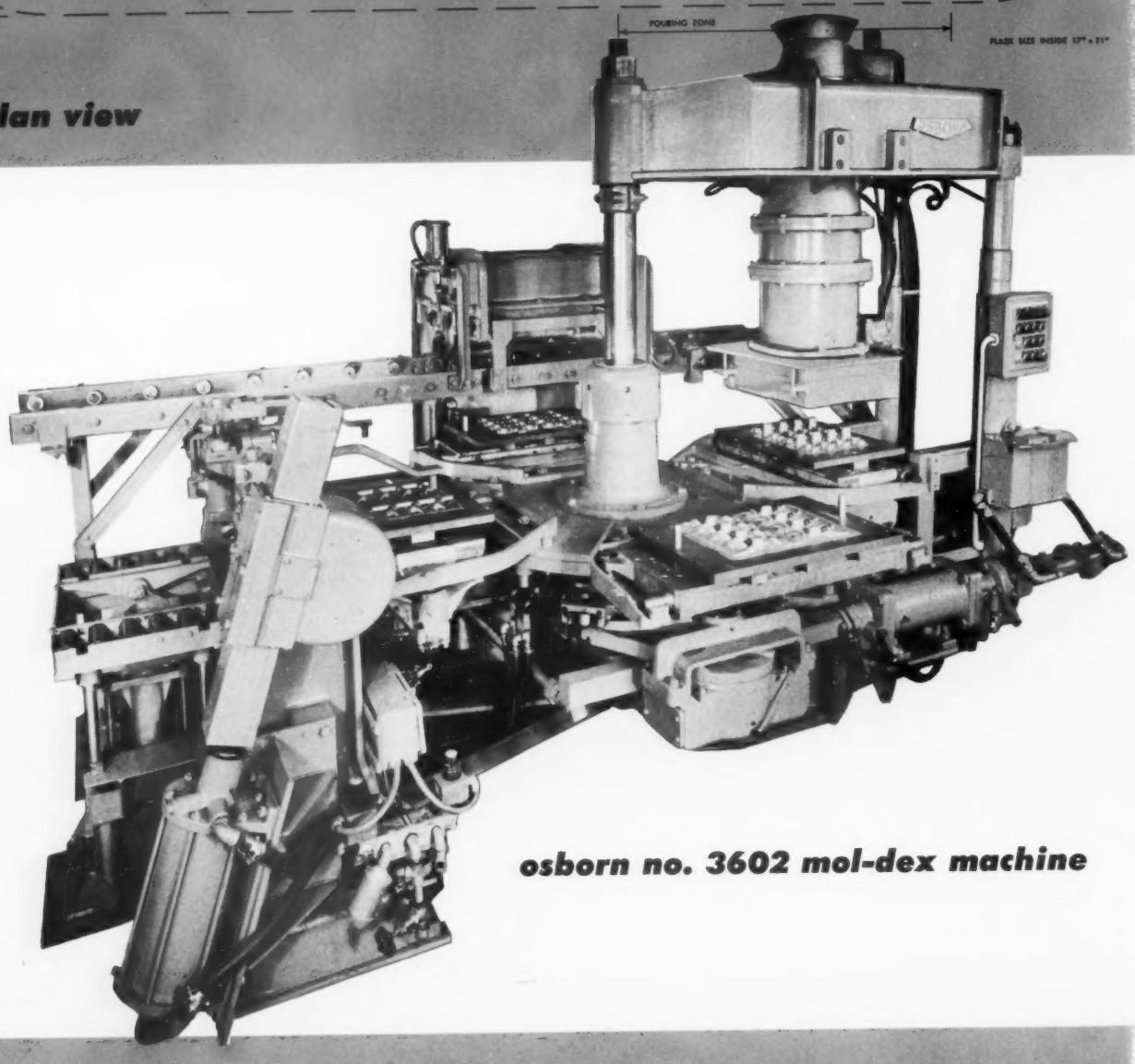
COPE STRIP—Roller bars engage flask rails for accurate stripping.



DRAG ROCKOVER AND DRAW—Drags indexed to third station for drawing.



plan view



osborn no. 3602 mol-dex machine

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Man to Man

RALPH L. LEE

"I sometimes think that the foundry industry would make much more progress if it were not for wet blankets thrown on new ideas by some of us old-time foundrymen who can't bear to think of any change"

AS THE years pile up on the sizable heap already to my credit, I find it more and more difficult to change my ways. I'm afraid that I'm becoming sentimentally attached to the conclusions I reached in the past and inclined to be a little irritable with anyone or anything threatening the even tenor of my ways.

The reason for my baring my innermost soul is a comment made a short time ago by my very dear friend John Linabury, retired foundry consultant for General Motors, pioneer mechanizer of the foundry industry and now chief engineer of the Lee Hobby Foundry.

This is what John said: "Ralph, I sometimes think that the foundry industry would make much greater progress if it weren't for the wet blankets thrown on new ideas by old fuddy-duddies like us who just can't bear the thought of any change."

"Now wait one minute, John," I bristled back. "I wouldn't say that either you or I have closed minds to changes—that is, if the changes will pay for the disturbance they create plus a worth-while profit."

"Be that as it may, Ralph, I know from my own personal experience that many foundries have slipped 'way behind the times and were deprived of profit from new developments by old-timers, proud of their spurs and sentimentally attached to the ways of their personal past."

"I always feel, John, that a couple of 'for instances' always do a much better job of making a point than generalizing or, let's say, philosophizing. Do you have an example or two in this case?"

"Yes, I do, and here is one. I'll not mention the name of the man involved, for you'd know him. But there's no question that he was an outstanding foundryman and a master molder to boot. He had won widespread recognition and headed up one of the foremost shops in the country.

"Time and again his boys came to him with suggestions and pleas to ditch his old core ovens and put in a more modern type. He said "No" with ever-increasing emphasis. In spite of their blueprinting the advantages for that particular type of production, including figures for dollars and cents savings plus additional and badly needed increased production, the old boy kept saying 'No'—and without an explanation."

"I imagine," John went on, "that those core ovens had been part and parcel of his splendid rise to foundry fame, and he just didn't have the heart to desert them at his peak."

John explained that this same fellow was dead set against conveyors, either straight or in loops. Again he wouldn't or couldn't explain why. He fought them tooth and toenail, until through sheer exhaustion he reluctantly gave in to high pressure from the powers that be.

The interesting thing John pointed out about this character was that in spite of his sentimental stubbornness in a few directions, his ingenuity in all others kept his foundry well up in front of the procession.

John had no question in his mind that hot blasts for cupolas have had a much tougher row to hoe than they deserved, due to the mental inertia of oldsters wedded to the past. He felt the same way about shell molding and said he wouldn't be a bit surprised that the CO_2 bonding process was in for abuse until the no-men had their noses rubbed into the proven advantages.

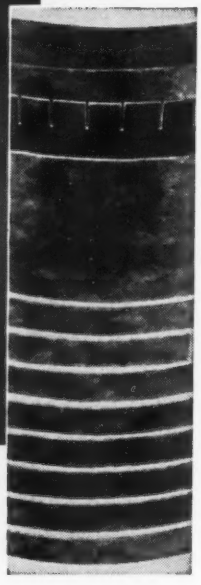
John concluded his eloquent tirade by adding, "The pity of all this is the high cost of worshipping the past and, even worse, the frustration of young up-and-comers trying to use their heads while butting them against the stone walls of unexplained noes."

I couldn't help agreeing with John in the instances he cited, but I felt that we shouldn't overplay this tune. Many oldsters he and I both know personally are 'way out in front of this progress parade and are an inspiration to the whole Thinker-Upper tribe.

Of course, the piling up of years and experience is bound to make the older more cautious than the young stripling just starting out all full of vim and vigor. When you can remember all of the different stunts, schemes, cure-alls and proposals which have been suggested throughout the years and the relatively small percentage which have proved their worth, it isn't surprising that older foundrymen should be a little skeptical or gun-shy at innovations.

And it is understandable why the principles, methods and devices which have proved themselves over a lifetime under all sorts of conditions and circumstances should not all lump themselves together to form a basis for judging the untried, the

Stearns uses a special mica plate for insulation around the inside diameter of the coil and between the pancake coils. Mica is laminated and consists of about nine layers of 1/32-in. molding mica. This is applied under heat and provides a very dense and hard insulation between the copper and steel. Discs between coils are also made of laminated mica and finished under pressure.



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DEEP-DOWN PULLING POWER

Protect the coil and you safeguard the very heart of a lifting magnet. That is why powerful, deep-field Stearns magnets are built with extra heavy-duty coil insulation, extra protection against shorts, burn-outs, current leakage.

With this insulation, a Stearns lifting magnet can withstand heat generated during steady work periods—operates profitably on long-shift duty. And it's added protection when magnet is working outdoors or under excessively damp conditions.

Superior insulation is only one of the ways Stearns keeps its powerful lifting magnets in top operating condition. See your Stearns representative for all the facts, or write for Bulletin 35-C.

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speculative and seemingly fantastic.

The big danger to well meaning oldsters, it seems to me, is taking this lumped up experience as a basis for hunches, intuition and feeling about saying "No" without the whys and wherefores or the "for instances."

Personally, I'm going to fight against that irritating tendency of many oldsters to pop off without thinking when something is proposed: "Oh, yes! I remember, way back when a feller had exactly the same idea. Can't quite recall what happened to it—don't think it amounted to much, though." Many things in common and profitable use today were tried and given up in the past. Timing seems to be the essence.

I'm going to watch, too, that I don't insist on others doing things the way I like when other ways are just as good and many times even better, for this tendency surely is a sign of creeping senility.

There is no reason in the world why experience should be a penalty or why persons of many years should throw monkey wrenches into the wheels of progress and become killjoys or musty old pains-in-the-neck. And we will not be if we separate our sentimental attachments for our ways and things of the past from the basic principles our past experiences have proved.

While Yes-men are in bad repute, No-men without explainable and acceptable reasons are just about as bad—even worse when they are in a position to make their noes stick.

Volume Contains 20 Papers On Vacuum Technology

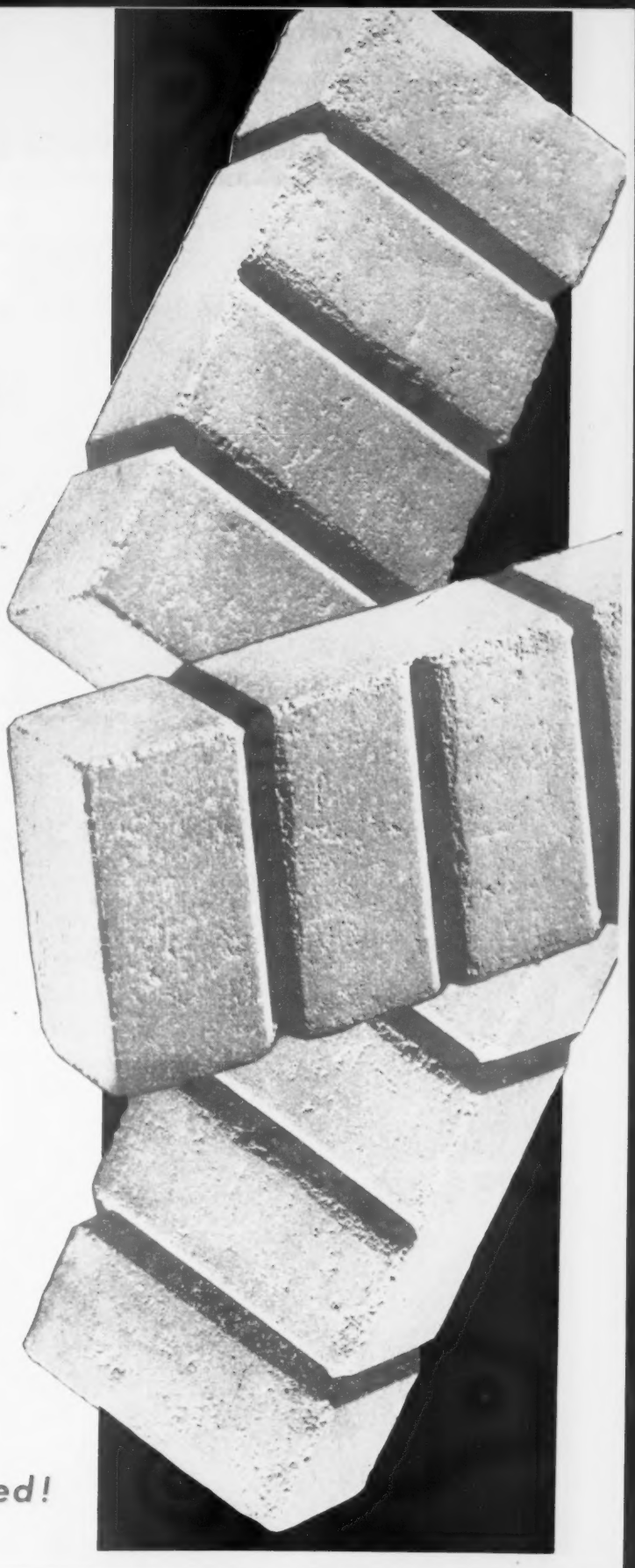
Committee on Vacuum Techniques Inc. has published its 1955 *Vacuum Symposium Transactions*. A 100-page book, it covers the technical program presented at the second annual Symposium on Vacuum Technology, held in Pittsburgh, Oct. 13-15, 1955. This committee, a corporation not for profit, was organized to sponsor symposia on vacuum technology and to assist in the dissemination of related knowledge.

The 20 papers presented at the 1955 meeting dealt with these broad subjects: Fundamental developments in vacuum technology; applications and processes; methods and techniques for obtaining high vacuum; standards and nomenclature.

Copies of the book are obtainable from the Committee on Vacuum Techniques Inc., Box 1282, Boston 9, for $10.

CLEANER IRON

and how to get it! *Famous* CORNELL CUPOLA FLUX



Famous Cornell Cupola Flux is a scientifically prepared mixture of high-grade fluorspar and other materials which create a chemical reaction in molten iron by greatly increasing slag flow off. Iron is cleaner, castings have greater tensile strength and are easier to machine.

EASY TO USE Famous Cornell Cupola Flux is easy to use. With each ton charge of iron, toss one scored brick into the cupola. It's as simple as that! The cost? Just a few cents per ton of metal. For gray iron and malleable foundries when melting in cupolas.

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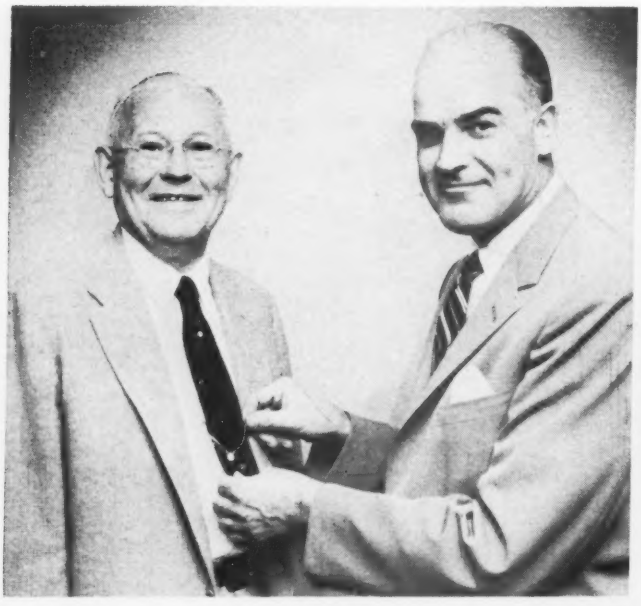
News Views



MARKS 50 YEARS: N. Stanley Snyder, left, Buffalo district manager, Link-Belt Co., receives his 50-year pin from D. E. Davidson, vice president for sales, Link-Belt, at the company's annual sales meeting, on June 28. Mr. Snyder is the oldest employee in length of service in the company's sales department. His first job in 1906 was as a file clerk

CAST IRON BEATS HEAT: When fire destroyed the vacated John Wanamaker department store building last July, the cast iron skeleton and facade resisted the high heat. New York firemen fought the blaze in the 94-year-old building for 33 hours and created a monumental subway jam when water from hoses flooded some lines. FOUNDRY prints this picture from the New York *Daily News* at the suggestion of a California reader who saw it reproduced in a San Francisco newspaper

DEDICATES NEW CENTER: Metal & Thermit Corp. dedicated on June 20 its new general office building, completed as a part of a new $2½ million combined general off.ce, research and distribution center in the Woodbridge-Rahway area of New Jersey. About 700 people attended an open house and luncheon for employees and their families. Left to right, touring the new building, are Donald C. Luce, president, Public Service Electric & Gas Co.; William H. McLean, president, Chemical Division, Merck & Co.; H. E. Martin, president, Metal & Thermit Corp.; Robert B. Meyner, governor of New Jersey; and Dr. K. C. Banks, director of research, M & T

OUTSTANDING AMERICAN: Frank G. Atkinson, president, Joseph Dixon Crucible Co., Jersey City, N. J., was cited as an "Outstanding American of the Year" by the John R. Longo Association of Jersey City and the Jersey City Independence Day Committee. Also named for commendation was E. M. Cabaniss, Dixon board chairman. Left to right: John R. Longo; Mr. Atkinson; James Clark, Jersey City commissioner; and Edward Zampella, secretary to Congressman Joseph Tumulty

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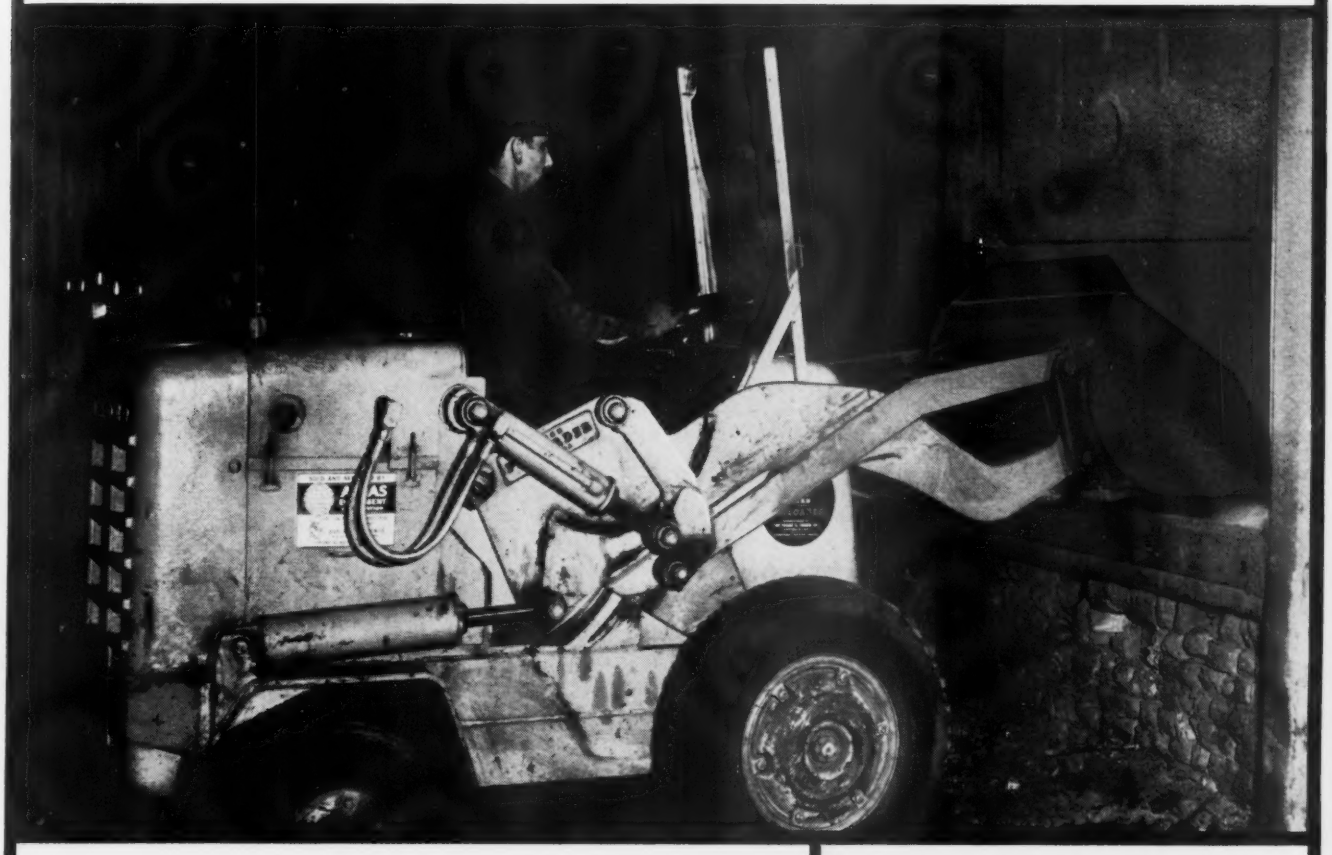

The predominance of "PAYLOADER" tractor-shovels at steel mills, foundries and industrial plants of all kinds is silent tribute to their ability to "take it" as well as to "dish out" real production on all kinds of bulk-material handling jobs.

Today's "PAYLOADER" units are the finest in tractor-shovel history — in handling ease and maneuverability, in productive capacity, in reliability and low maintenance. And today's "PAYLOADER" line is also the most complete, most-proven line of tractor-shovels available — from 18 cu. ft. to 2¼ cu. yd. bucket capacity.

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FRONT-WHEEL DRIVE
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- Model HAH — 1 cu. yd. capacity

REAR-WHEEL DRIVE
- Model HF — 1 cu. yd. capacity
- Model HFH — 1⅓ cu. yd. capacity

FOUR-WHEEL DRIVE
- Model HU — 1⅓ cu. yd. capacity
- Model HH — 1¾ cu. yd. capacity
- Model HO — 2¼ cu. yd. capacity

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Around the Country

NEWS REPORTS FROM

Cleveland . . . Detroit . . . Los Angeles . . . Philadelphia . . . Chicago . . . New York . . . Pittsburgh

Los Angeles—With most steel foundries back in full swing after the steel strike, melting rates average 90 per cent of capacity. This year most foundries abandoned the practice of closing down for company vacations. Instead, employees usually are taking vacations on a staggered basis.

Foundries were not hurt by the steel strike, although the anticipated shortages in the late fall may be felt. Most steel foundries have had large quantities of scrap on hand. No. 1 cupola cast prices are unsteady, but average $44 per gross ton.

The aircraft industry is humming, with aluminum foundries active. Several new aircraft designs are expected to keep the aluminum shops at full capacity through December.

Detroit—Speculation runs high in the area as to the future of Studebaker and Packard automobiles. General opinion is that fewer models will be offered in both makes as plans progress under the three-year advisory management contract between Studebaker-Packard Corp. and Curtiss-Wright Corp.

As of now, Studebaker will offer a face-lifted line for 1957. Immediate plans for Packard are unknown. Minor face-lifting had been planned for 1957 Packards which could be built at South Bend, Ind. It generally is thought that extensive changes based on the experimental Packard Predictor would be incorporated in a 1958 model to be released in late summer. With probable assembly of the cars at the Studebaker Division plant in South Bend, it is presumed that castings will also be produced there.

* * *

Chrysler Corp. has purchased over 1,700 acres of farm land in Troy Township, north of Detroit, as a site for possible future expansion of its engineering and research facilities. Few such large tracts are available in the Detroit area, and the purchase is "insurance" for potential expansion. No building program is contemplated now.

* * *

Because many foundries in Detroit are tied in directly or indirectly with automotive work, they are experiencing a slack period. This is the time of model changeover, and production runs for 1957 parts are just starting. Shops making dies, jigs and fixtures are in the same doldrums, waiting to start on 1958 model work.

Cleveland— The newly organized Marketing Committee of the Gray Iron Founders' Society, Cleveland, endorsed a broad marketing program designed to help members improve their marketing practices and enlarge the over-all market for gray iron castings. The program was presented by the society's marketing director, Richard C. Meloy, at the first meeting of an eight-man committee held in Cleveland July 20-21.

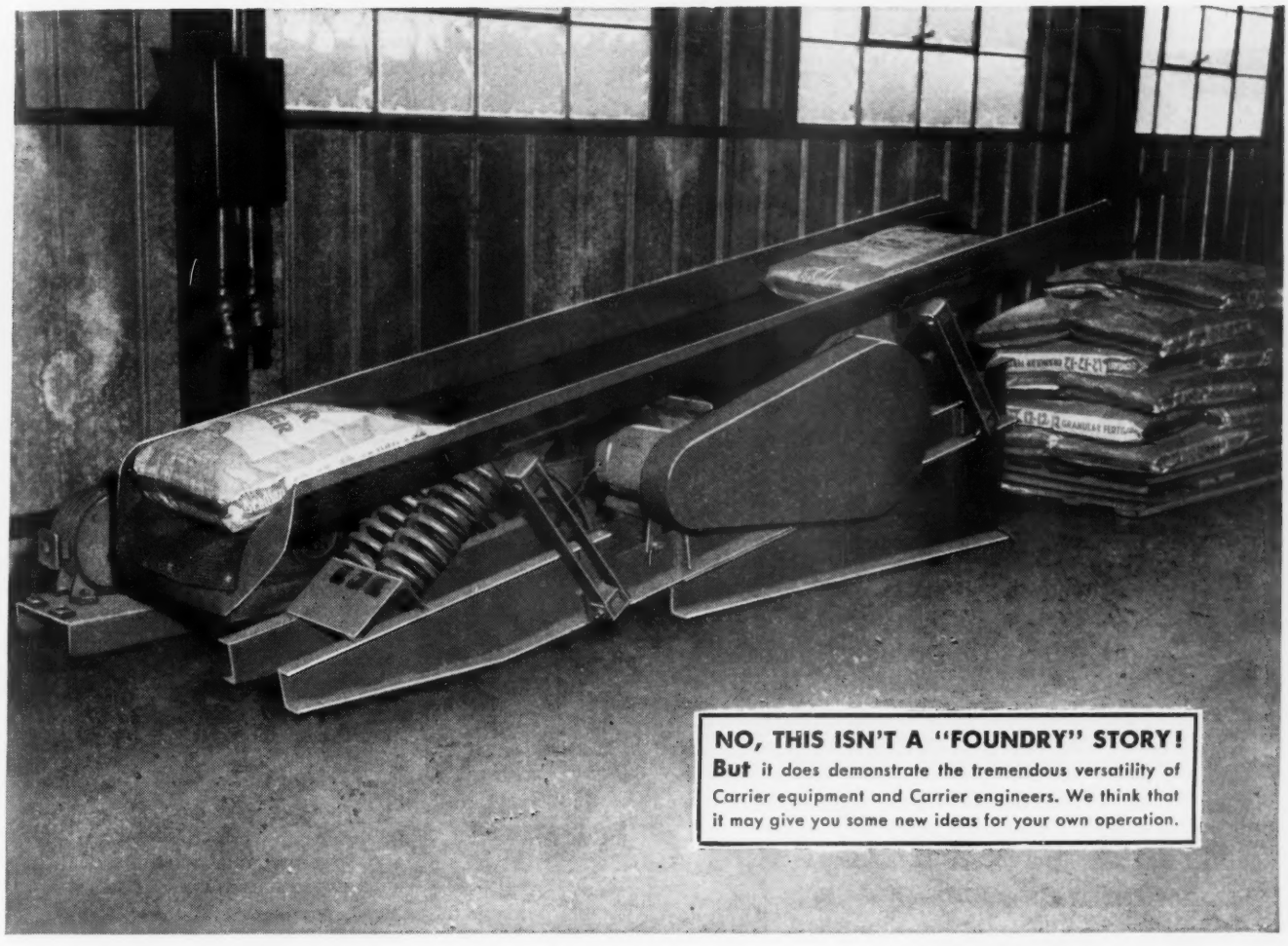
The program will be based on facts to be gathered by comprehensive surveys directed to design engineers, sales executives, purchasing agents, foundries and the public. Results of these surveys will be discussed at regional sales clinics for member foundries.

According to Donald H. Workman, GIFS executive vice president, marketing in the industry has not kept pace with other technological advancements. As a result, gray iron castings covering a wide range of properties and characteristics have not reached their full possibilities in range of applications. The new marketing program is designed to close this gap and show foundries how they can better serve their customer industries and suggest new product developments.

Chairman of the committee is William S. Thomas, vice president, Emmaus Foundry & Machine Co., Emmaus, Pa. Others on the committee are: Harold Brown, sales manager, industrial castings, Hunt-Spiller Mfg. Corp., South Boston, Mass.; Warren

GRAY IRON MARKETING: Marketing Committee newly formed by the Gray Iron Founders' Society is shown here with GIFS staff members. Left to right: Harold Mitchell, field director; Harold Brown, Hunt-Spiller Mfg. Corp.; W. M. Dalton, Dalton Foundries Inc.; W. S. Thomas, Emmaus Foundry & Machine Co. Inc.; W. W. Brown, Carondelet Foundry Co.; Richard C. Meloy, marketing director; W. A. Morley, Link-Belt Co.; W. M. Grimes, Gartland Foundry Co., and Donald H. Workman, GIFS executive vice president

CARRIER *does the "IMPOSSIBLE" for the biggest names in industry!*


NO, THIS ISN'T A "FOUNDRY" STORY!
But it does demonstrate the tremendous versatility of Carrier equipment and Carrier engineers. We think that it may give you some new ideas for your own operation.

This Conveyor Stretches Freight Cars!

THESE bottom-heavy bags of plastic material are being flattened, for storage and palletizing for shipment, by a Carrier Natural-Frequency Conveyor...

They used to be flattened manually, one at a time, by two men who literally patted them into shape. It was a slow, expensive operation. And unfortunately, conventional bag flatteners couldn't do the job satisfactorily because the product was too light and fluffy.

The solution called for imagination and Carrier engineers were quick to supply it. They soon designed a Natural-Frequency Vibrating Conveyor that did the trick perfectly. It's a 9' conveyor that gently tosses the bags along a slight uphill grade. When the bags come off, they are so flat that *15% more of them can now be put in a freight car.* The whole operation has also been speeded up, and labor costs substantially reduced.*

Flattening bags is one of hundreds of unusual applications for Carrier Natural-Frequency equipment. It points up the versatility of Carrier products, the ingenuity of Carrier engineers (who are the actual parents of today's modern, *practical* vibrating conveyors, and who know more about this type of product than anybody else in the world).

Carrier Natural-Frequency Conveyors offer almost unlimited processing possibilities. Tell us the sore spot in *your* materials-handling or processing set-up and we'll be glad to submit recommendations.

**Carrier, in cooperation with your packaging engineers, can integrate the bag-filling, closing and flattening operations, without re-handling. Interested?*

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CONVEYORS

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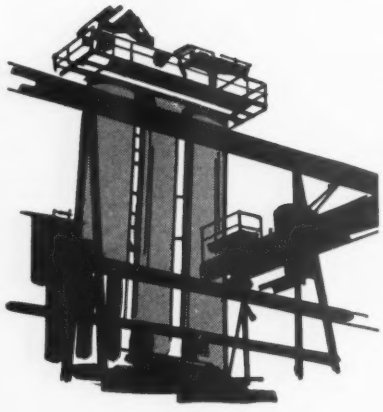
The big selling point for

TERRE HAUTE SPECIAL FOUNDRY COKE

is the way foundries buy it . . .



• They buy it for top ratings in chemical and physical qualities—for clean sizing—for uniformity that occurs alone from exceeding care.

Only premium grades of West Virginia coking coals go into it—the best the market affords.

RESULT? You choose wisely and permanently when you specify Terre Haute Special Foundry Coke.

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Circle 668 on Inquiry Card—Page 245

YOUR BEST *Tip* IN CARTS

No. 119 *Sterling* HEAVY-DUTY CART

If you're looking for a good tip for wheeling coal, scrap, chips, turnings or similar heavy materials, see these Sterling Heavy Duty Carts. Over and over again the "3-Point Landing" feature of this well-balanced cart will convince you it's the best buy for years of service. Can be furnished with pneumatics, as shown, or steel wheels . . . plain or roller bearings. Write for Catalog.

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Sterling WHEELBARROWS

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Circle 669 on Inquiry Card—Page 245

W. Brown, vice president in charge of sales, Carondelet Foundry Co., St. Louis; W. M. Dalton, vice president, Dalton Foundries Inc., Warsaw, Ind.; William M. Grimes, vice president, Gartland Foundry Co., Terre Haute, Ind.; William A. Morley, general superintendent, Philadelphia operations, Link-Belt Co.; J. E. Quest, president, Quest Mfg. Co., Minneapolis; Thomas W. Curry, director of research, Lynchburg Foundry Co., Lynchburg, Va.

New York— Gray iron shops making heavy castings enter September with substantial backlogs. Some shops have as much as eight to nine weeks' work on hand. Those engaged in light work have two to three weeks' business ahead, and while they see no immediate increase in their bookings, they anticipate close to normal operations throughout the fall. The outlook is particularly promising for those specializing in machinery and construction requirements.

Such limited steel and malleable casting capacity as prevails in this area was well engaged throughout August, backlogs averaging several weeks. In malleable, hardware requirements appeared outstanding.

Some brass and bronze shops regard their business as "excellent." Meter work has been especially good, and plumbing supply requirements have been active. A very good demand is noted for industrial valves and pumps and for miscellaneous shipyard requirements. These latter have been steadily mounting for several months and the uptrend is expected to continue.

While demand for household durables has been rather easy over recent weeks, aluminum shops in general have been able to keep busy. Those specializing in aircraft and radar requirements report a steady increase in backlogs. Some are booked eight and ten weeks, it is said.

Prices for raw materials, such as scrap, pig iron and metals are moving upward and are being reflected in stronger prices for castings.

Pittsburgh— Many foundries in this area settled labor contracts after major steel producers signed with labor unions in early August. Contracts were patterned after the settlement of U. S. Steel Corp. Some foundries have other expiration dates in their labor contracts.

Another two-way squeeze on foundries developed as pig iron and labor costs increased simultaneously. The principal supplier of merchant pig iron increased its prices $2.50 a ton during the strike in anticipation

of higher labor costs. When the strike ended, other pig iron producers also increased prices $2.50, stabilizing quotations at the higher level.

From the standpoint of foundries' inventories, the steel strike ended quickly enough to avoid serious difficulties. Pig iron stocks were high in late second quarter. During midsummer, vacations and the steel strike slowed demand for castings. Most foundries had enough raw materials to continue operations. If the strike had continued into September, they would have been hard-pressed for scrap and pig iron.

With steel mills expecting to be back to capacity operations by the fourth quarter, outlook for foundry sales to the mills is very good for the balance of this year.

Philadelphia— Casting demand increased in August, setting the stage, in the opinion of many, for a brisk fall business. More foundries and consumers of castings took mass vacations in July than usual because of the steel strike. This was reflected in better activity in August than would otherwise have been the case. However, the walkout in steel which ended early in August did cause dislocations which were felt in the foundry industry through most of the month.

With a veritable scramble for steel under way, pointing to high operations in the metalworking field generally, for some weeks to come, it is reasonable to assume that the foundry industry will share in this activity.

Gray iron shops engaged in heavy work have backlogs of six to ten weeks, with considerable work ahead for builders of mill equipment and machinery of various descriptions. Demand for paper mill equipment appears particularly brisk, but auto die work has faded and textile mill requirements are lagging. Those engaged in light squeezer work are booked ahead no more than two or three weeks, but all gray iron shops are operating on a good five-day-a-week schedule.

Steel foundries are operating at normal capacity (single shift, five days a week, with full working forces), and in general have backlogs averaging about two months. Again heavy mill equipment is a factor, plus substantial requirements for utilities. Most malleable shops reflect a strong demand for pipe fittings and builders hardware, although volume is not as active as in the spring. Malleable operations are close to normal capacity, however, and backlogs average seven weeks.

Brass and aluminum business has

See the difference **FOSECO** *makes . . . in brass, bronze and nickel alloys*

And They're So Easy To Use — Just . . .

ADVANTAGES

1. Removes harmful gases and oxides
2. Cleans metal of solid impurities
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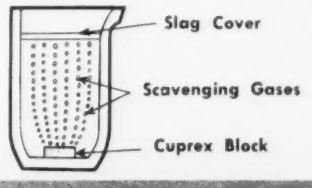
4. Effectively deoxidizes the metal
5. Gives sound, pressure-tight castings
6. Improves physical properties
7. Insures accurate flux additions
. . . it's safe, effective, economical, scientifically sound and so easy to use.

1. Place Cuprex Blocks (½ to 1% of the charge weight) on the bottom of the empty crucible. Charge as usual. The Cuprex Blocks remain at the bottom, giving off oxidizing or scavenging gases throughout the melting period . . . cleaning and degassing the melt.

2. As the blocks disintegrate, they form a protective slag cover on the metal surface.

3. At the end of melting, deoxidize by either plunging the Deoxidising Tubes or pouring the metal on them.

4. Then skim off the slag and pour the casting.



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Send this coupon for these free leaflets giving all the facts about treating brass, bronze and nickel alloys.

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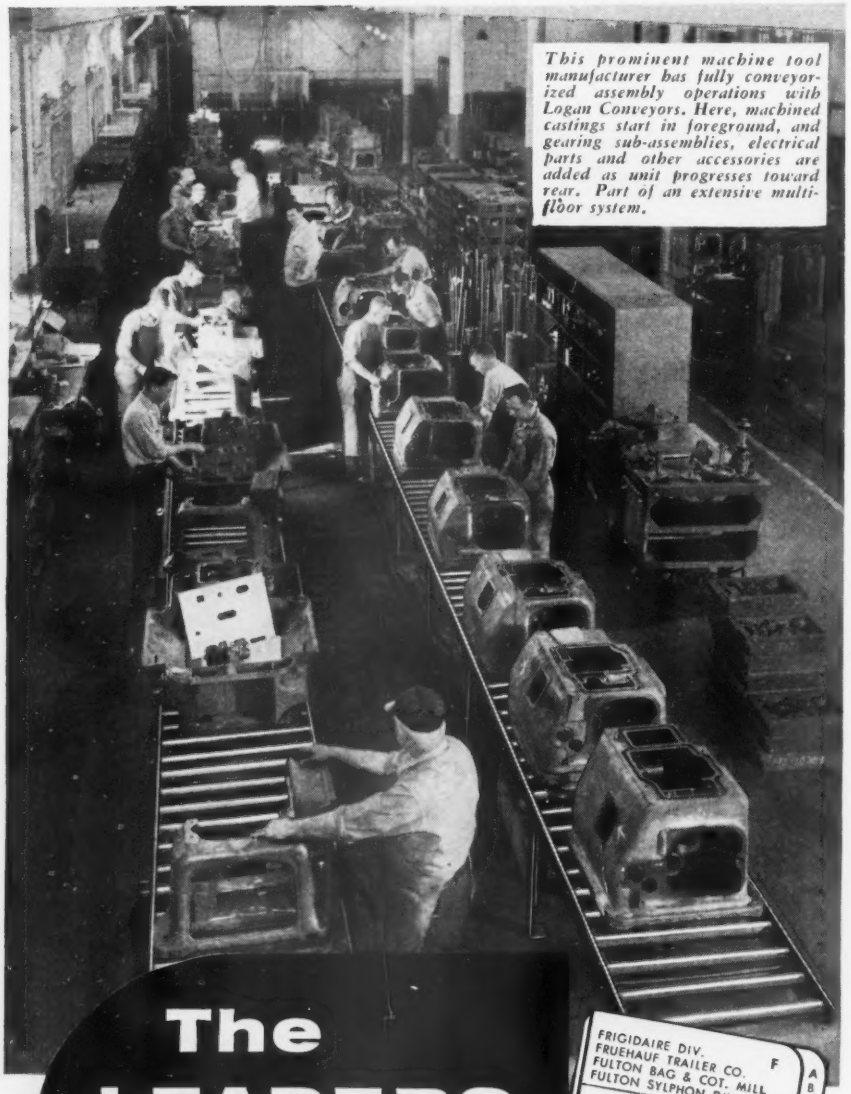

This prominent machine tool manufacturer has fully conveyorized assembly operations with Logan Conveyors. Here, machined castings start in foreground, and gearing sub-assemblies, electrical parts and other accessories are added as unit progresses toward rear. Part of an extensive multi-floor system.

The LEADERS use Logan

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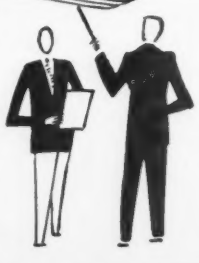
"Hitch your wagon to a star" is a philosophy which helps to make our industrial leaders. Part of this philosophy is the exercise of care in the selection of vital plant machinery such as conveying equipment. In thousands of successful establishments Logan Conveyors speed output, increase capacity in the same plant, conserve manpower, make satisfied employees. Logan can serve you, too. Write for further information or for nearest engineer to call.

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.



Logan Conveyors

Circle 671 on Inquiry Card—Page 245

been holding up well. Considerable brass and bronze go into the plumbing supply lines and into industrial valves and pumps and shipyard requirements. Most shops have good backlogs on hand and this is particularly true of aluminum foundries engaged in aircraft work.

Chicago—Now that foundry coke no longer is produced in Chicago, cupola fuel is going to cost foundries about $3.12 more a ton, since it must be shipped into the district. Last month this column reported that Peoples Gas Light & Coke Co. shut down its coke ovens permanently the last of June after 35 years.

With a Chicago oven price of $27 a ton, coke was delivered to the consumer for $1.50 switching charge involving a one-line haul and $1.70 for a two-line switching charge. Bulk of shipments was in the latter category, making the price $28.70 delivered.

Competition for the future foundry coke business here developed speedily from several directions, including ovens in Milwaukee, Indianapolis, Terre Haute, St. Paul, and other points. Price currently is determined by St. Paul, which has a $28.50 oven price and a favorable freight rate to Chicago of $3.32, to give a delivered price of $31.82. This price is being met by cokemakers in all other cities. It includes a $2 general price increase early in August.

* * *

Despite the five-week midsummer steel strike which idled most captive blast furnaces, midwestern foundries experiencd no lack of pig iron. A number of factors contributed to this fortunate circumstance. Foremost, perhaps, is the fact that most foundries increased iron inventories sharply in June in anticipation of higher prices after midyear and possibility of blast furnace operations being curtailed in event of a steel strike.

A second contributing factor was reduced consumption of iron due to July and August vacations. Still another was the uninterrupted operation of some blast furnaces.

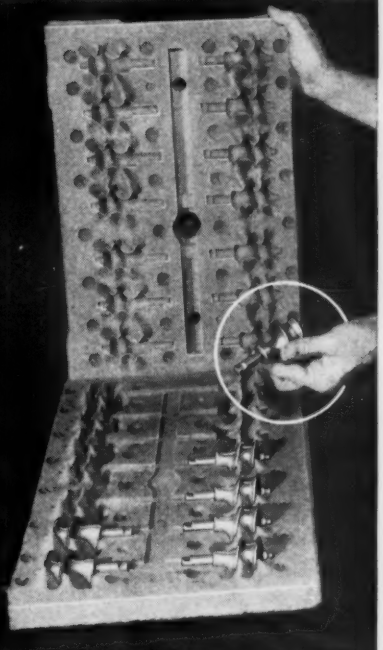
* * *

Kearney & Trecker Corp., Milwaukee, is shutting down its pattern shop Sept. 4 and will rely entirely on job shops for its future pattern requirements. Affected are 15 workers. The company, which does not operate a foundry, explains it is more economical to send its work to outside shops, which now make 50 to 60 per cent of its needs, than to use its own facilities. The company seeks to sell its plant No. 2, which is south of the main plant at 6784 W. National Ave. The 100,000-sq-ft structure housed the pattern shop and some production facilities.

FOR FASTER CURES...SMOOTHER SURFACES...BETTER CASTINGS

CATALIN SHELL MOLDING RESIN 9616

View of automatic shell mold machine, indicating shell ejection operation, shown to left... And a typical shell mold specimen, shown below... were photographed at the foundry of C. A. Goldsmith Company, Newark, N. J.



Higher production rates, new advanced techniques and automatic equipment, smoother and more accurate castings are the direct industrial contribution of the shell molding process . . . yet without fast-setting phenolic resins to bond the sand, the entire process could never have been possible! Since first introduced, too, shell molding resin formulations have also undergone self-transition periods of change and betterment.

Today Catalin Resin 9616, a two-stage, powdered phenol-formaldehyde resin, emerges as the very latest and best type of formulation.

This economical resin produces high-speed curing rates with the minimum of resin content. Savings are achieved in time, sand, work space, handling and metal. Castings are more accurate and smoother — require considerably less finishing.

In addition to Shell Molding Resin 9616, Catalin produces a wide range of core binding liquid resins and powders for the production of ferrous and non-ferrous metal castings.

Catalin representatives, familiar with the requirements of the foundry industry, are available for consultation. Samples on request! Write . . .

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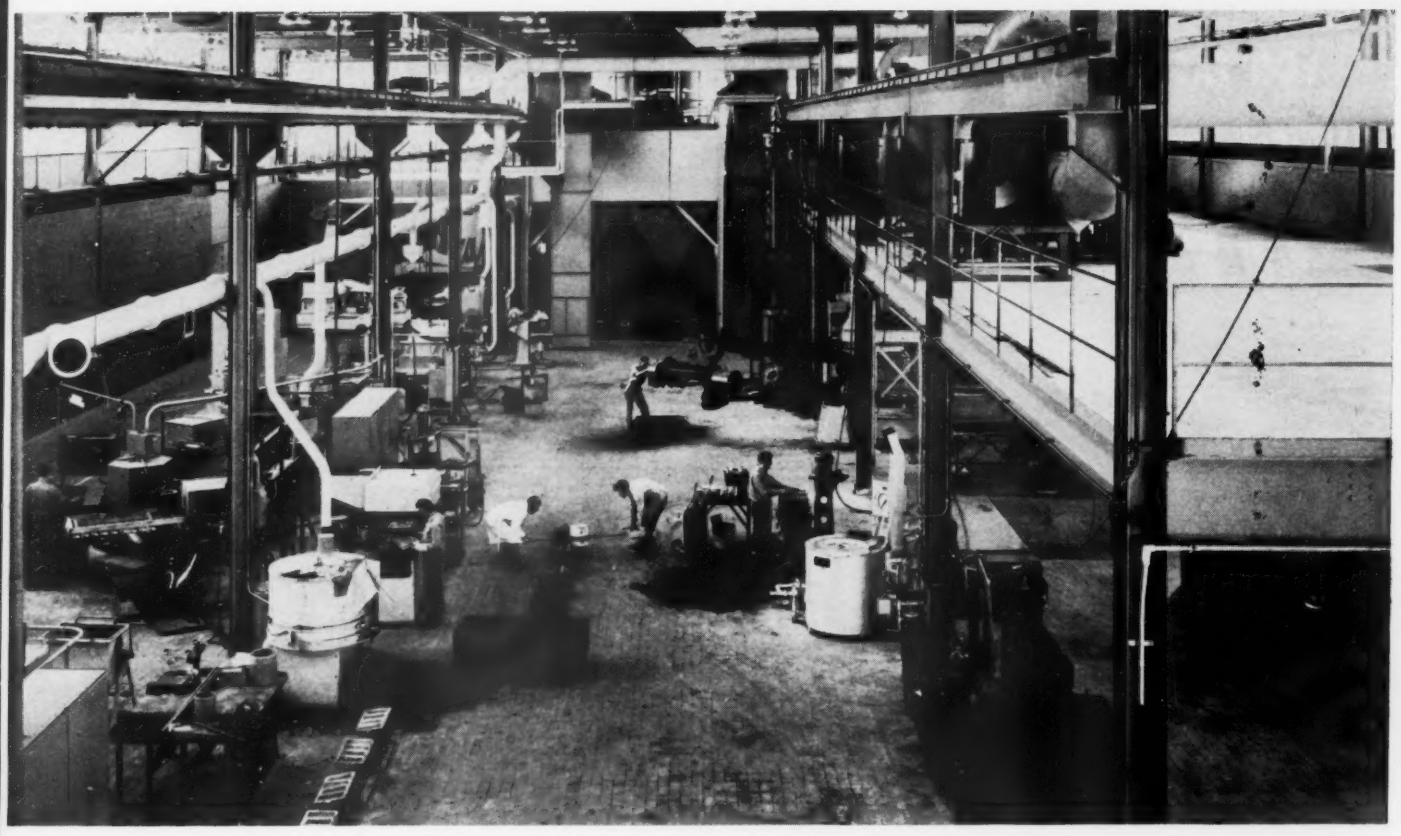


Project work, experimental molding, pouring, nonferrous casting and cleaning operations are performed in this section of the foundry

DEVELOPMENT FOUNDRY

Explores and Improves Techniques

Of the two General Motors Technical Center foundries, the work of the Process Development Section unit is closer to full-scale operations and translates research findings into production processes

RESEARCH operations at General Motors Technical Center, Warren, Mich., incorporate two experimental foundries. Work done in the Metallurgical Engineering Department of the Research Staff Section was described in FOUNDRY for July. It covers mainly research into alloys and molding methods.

The Process Development Section foundry works primarily to translate research discoveries into production processes and to develop and improve manufacturing techniques. It occupies an area 120 x 240 ft in the Process Development Shop Building.

Pilot production molding is done on four jolt-squeeze-strip machines located in a mold conveyor loop. On the jobbing floor, a sandslinger is used to ram large molds. Nonferrous operations also are conducted in a section of the jobbing floor. Equipment includes a jolt-squeeze molding machine and a 400-lb gas-fired crucible furnace for melting aluminum. It is equipped with a recording pyrometer and nitrogen fluxing system.

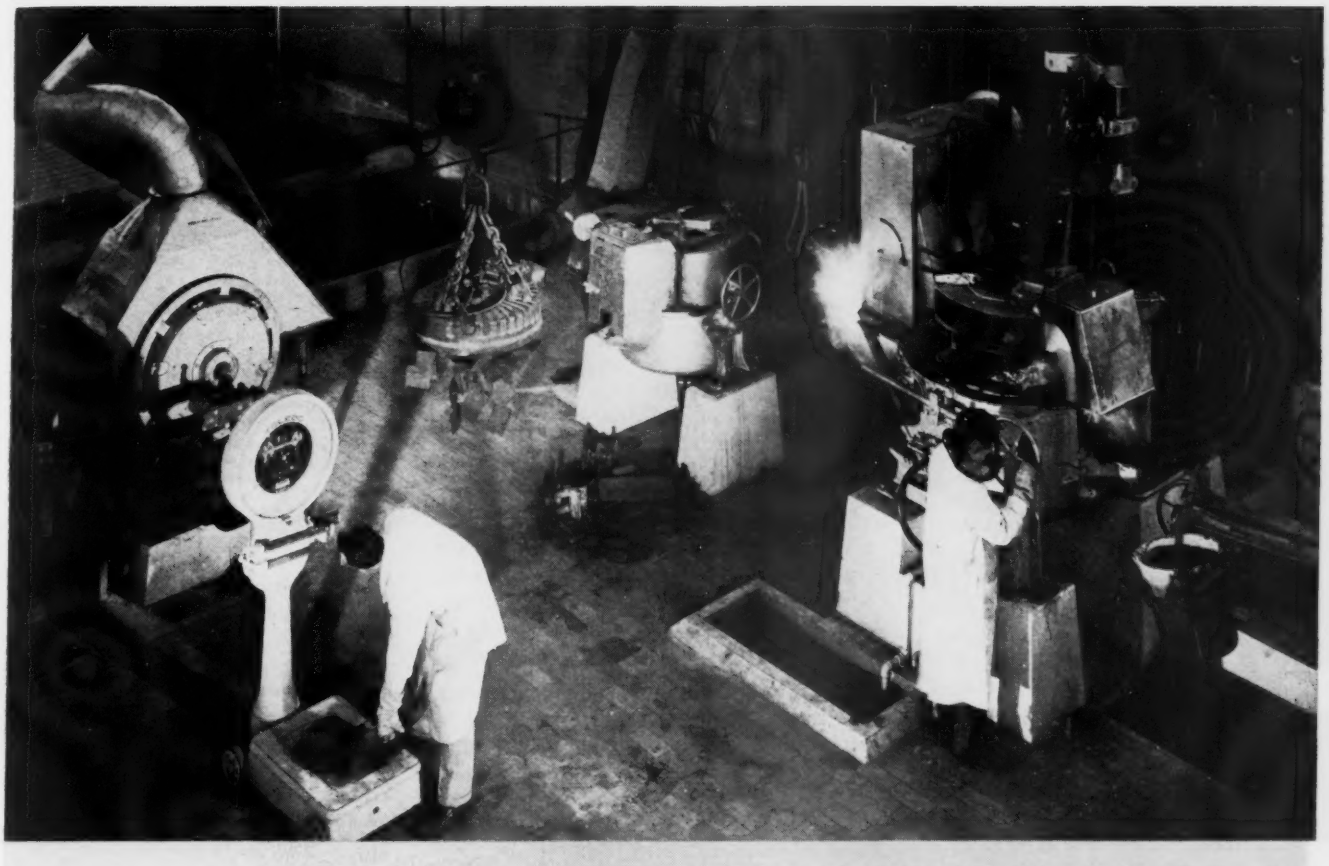
Three electric arc furnaces in the main melting area have a melting capacity of 1550 lb of ferrous, brass or bronze alloys an hour. Future plans include installation of a cupola.

A three-station, two-pattern, automatic rotary indexing shell molding machine can be equipped with a blow head or dump box to evaluate each method of shell making. Other shell molding equipment includes a machine for making hollow cores and hand-operated dump box equipment.

Four core blowers, three rollover-draw machines, a muller, weigh hopper, sand distribution system and a gas-fired batch oven are located in the coreroom.

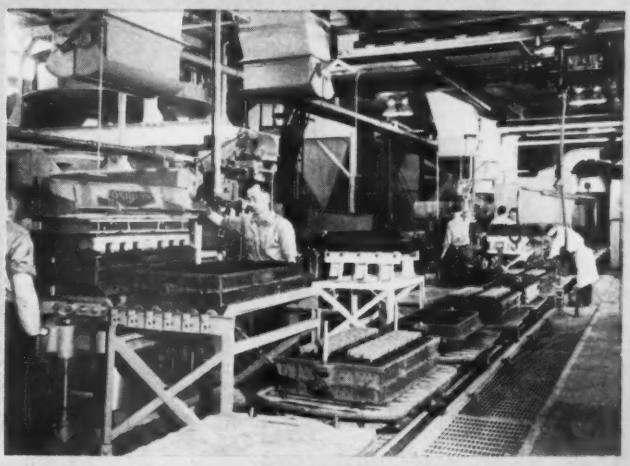
The new sand handling system is unusual. Trucks dump sand into a below-floor-level hopper from which a pneumatic conveyor moves it to storage bins in the coreroom and molding sand preparation centers. Belts feed molding sand from the various bins back to the pneumatic pressure vesel for blowing to a plate feeder which feeds, selectively, into four storage bins over the mulling area. A vibrating feeder below each hopper feeds sand to a weigh hopper over the batch muller. Thus sand from any four GM foundries can be segregated for experimental work.

Bonding materials are stored in five hoppers from which they are weighed to formulate the various



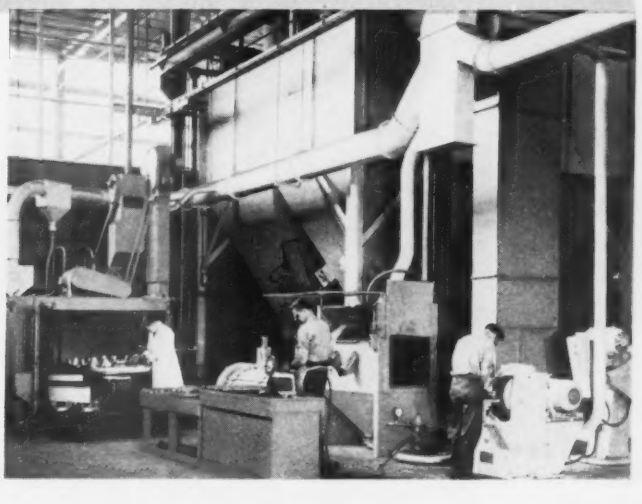
Melting area contains three arc furnaces with capacity of 1550 lb of ferrous metals an hour. Ingredients are weighed exactly. A 5-ton, cab-operated crane with magnet services furnaces

Pilot production area contains two cope and two drag machines. Mold loop conveyor will travel 9 to 36 fpm. Diversified development work under production conditions is possible



Nonferrous work is done on the jobbing floor. Facilities include a crucible furnace with a recording pyrometer and nitrogen fluxing equipment, sand screen and jolt squeeze unit

Casting cleaning equipment includes an airless blast tumbling machine, table blast unit, sand blast cabinet, snagging grinder and air tools



"We get better castings with Borden shell mold resins"

In your shell mold operation you'll find that you'll get the most from your equipment if you use Borden's THOR MCF-7 resin. It provides full-thickness build up, even on angular and vertical pattern surfaces . . . and it helps produce a flat, rigid shell without warpage that strips off the pattern cleanly and easily.

To get better castings, let a Borden foundry engineer set up a trial run of Borden's THOR MCF-7 resin. Write The Borden Company, Chemical Division, Foundry Dept. F-96, 350 Madison Ave., New York 17, N. Y.

Urea • Phenolic and Oil Soluble Resin Core Binders
Shell Mold Resins • Core Spray
Core Paste • Parting Agents

FOUNDRY RESINS

THE Borden COMPANY CHEMICAL DIVISION

Cost Figures Prove New Core-Curing Technique Economical and Time-Saving

New York, N. Y.—An important announcement came today from the Foundry Department of The Borden Company, Chemical Division, concerning Borden's new heated-air process for curing cores in the core box. Mr. Donald J. Murray, Foundry Department Manager, made available for the first time cost-figures and time-saving estimates showing the high efficiency of this technique that involves blowing a stream of heated air through a properly vented box to bake the core to exact core-box dimensions, while assuring smooth, clean castings.

Tests Prove Economy

The results of tests by Borden Engineers, showing the efficiency with which air is heated in the new Borden process, were revealed in detail. In the tests, the sand mix used consisted of 1000 parts of Wedron AFS-70, 20 parts of urea resin FB-24 (1% solids), and 10 parts of water. Power required to heat 8,000 cu. ft. of air to 100° in a GCH-34 Heater is 4.5 kwh. The power cost for the first 4,000 kwh was found to be only $0.017 and the power cost to dry one pound of core from a 2% moisture content was a mere $0.00022.

Time-Saving Example Cited

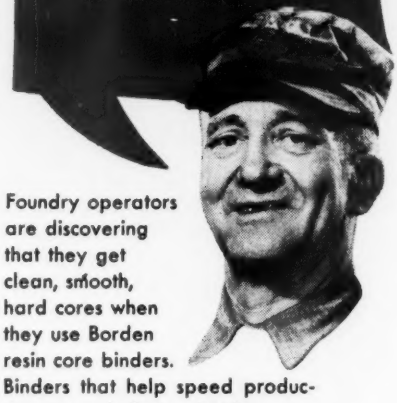
Mr. Murray also revealed that this new process dries cores in a fraction of the time required in ovens. This example was given: A seven pound circular core, two inches thick, made from core sand ASF-70, completely dried and cured in *one* minute in the core box with cold-air pressure at 20 psi. and hot-air temperature at 400°F. using a one-half inch pipe connected to the heater and to the core box manifold.

Full Information Available

Foundry operators interested in this technique can obtain full information from Borden, Mr. Murray stated. Write to the Borden Company, Chemical Division, Foundry Department F-96, 350 Madison Avenue, New York 17, N. Y.

"This new Borden Core-Curing Technique is so efficient our men only have to take an occasional 'work break!'"

"We get better cores, faster with Borden core binders"



Foundry operators are discovering that they get clean, smooth, hard cores when they use Borden resin core binders. Binders that help speed production through faster baking . . . assure easier shake-out . . . contain no volatiles to gum up oven interiors . . . and eliminate smoke so working conditions are better.

Perhaps a Borden core resin can help solve some of your foundry problems. Contact us today for a trial run with a Borden foundry engineer to assist. The Borden Company, Chemical Division, Foundry Dept. F-96, 350 Madison Ave., New York 17, N. Y.

Urea • Phenolic and Oil Soluble Resin Core Binders
Shell Mold Resins • Core Spray
Core Paste • Parting Agents

FOUNDRY RESINS

THE Borden COMPANY CHEMICAL DIVISION

mixes. Bucket elevators, belts and plows distribute prepared sand to molding station hoppers. Spill and shakeout sand is screened and run over a magnetic pulley before being returned to storage.

Equipment in the casting cleaning room includes a 27 x 36-in. airless blast tumbling machine, a 66-in. table blast unit, sand blast cabinet, 20 x 48-in. tumbling barrel, a 24 x 3-in. single-wheel snagging grinder and pneumatic chippers and grinders of various sizes. An annealing furnace also is located in the cleaning area.

A pattern shop is equipped to make wood, metal and plastic patterns as well as models, blowplates and fixtures. A complete sand laboratory is part of the foundry, but metallurgical and chemical lab facilities are available in the adjoining metallurgical department.

The foundry is well lighted and equipped with dust collection and ventilation units. Cranes and monorail ladle cariers aid handling.

Maintenance and Engineering Show Is Set for Cleveland

Eighth annual Plant Maintenance & Engineering Show will be held in Cleveland next Jan. 28-31. Concurrently with the exposition, the annual Plant Maintenance & Engineering Conference will be conducted.

The show will be the largest in its history, with about 400 exhibits expected to occupy 100,000 square feet of display space. This will make it one of the three largest annual industrial expositions in the country.

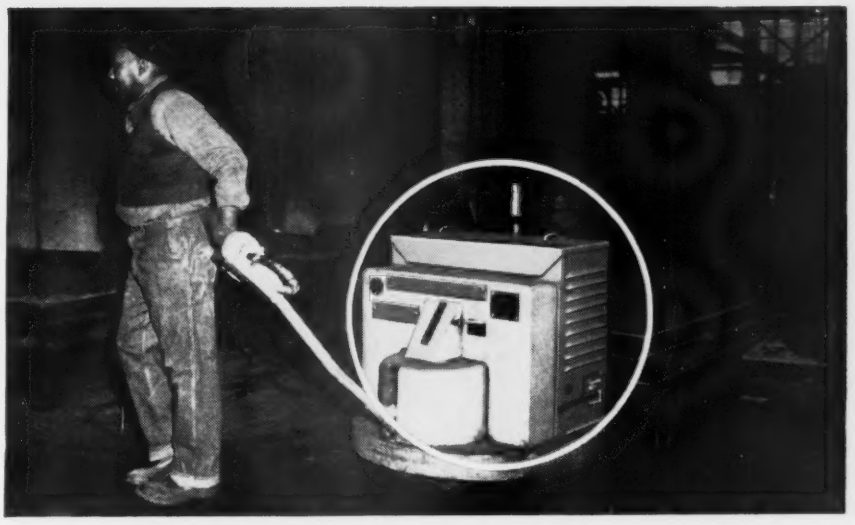
Clapp & Poliak Inc., 341 Madison Ave., New York 17, is managing the show.

Book Review

The Running and Gating of Sand Castings: A Review of the Literature, by R. W. Ruddle, cloth, 183 pages, published by the Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England. Price $3.75.

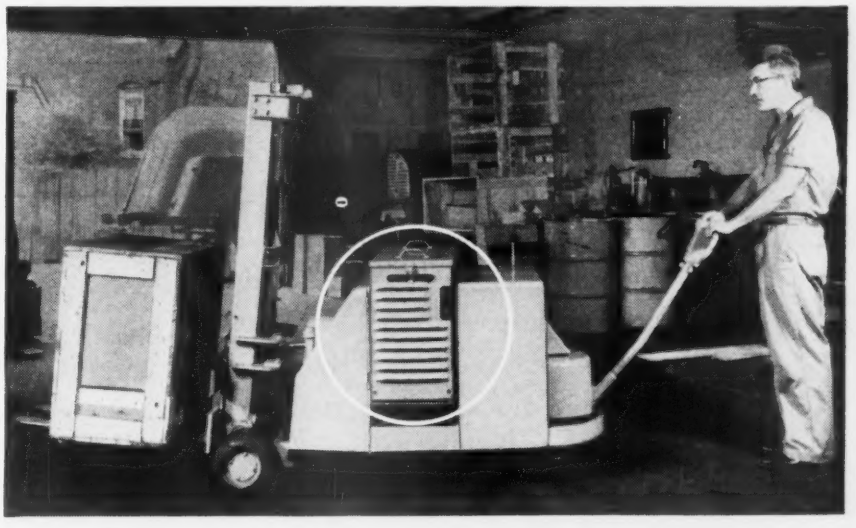
Many of the defects found in sand castings are caused by the use of unsatisfactory methods of running and gating. Research workers have devoted considerable attention to the subject and have made numerous studies of the flow of metal in commonly used gating systems, and of fundamental principles involved, with the object of placing design of gating systems on a scientific basis.

The author, head of the Melting and Casting Section, British Nonferrous Metals Research Association, reviews the results of these studies and gives details of methods by which the rate of flow of metal in gating systems may be computed from their geometry.



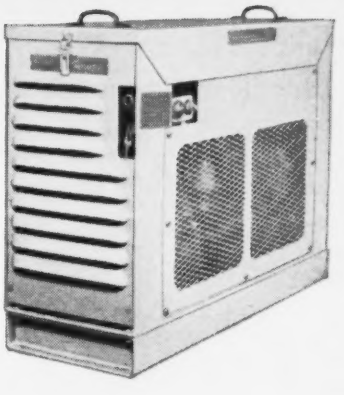
The Most Versatile Power Unit Ever Developed For Small Trucks

READY-POWER BANTAM MODEL W



Only the compact new Bantam Model W provides smooth, dependable gas-electric power that can be quickly interchanged from truck to truck.

A new high-performance unit features 12-volt automotive-type starting and ignition system plus complete choice of idling speed. Full access to engine and generator simplifies adjustment, even on the truck. Fits practically all makes of walkie and rider trucks up to 2000 lbs. *Write today for full information.*



READY-POWER

The READY-POWER Co., 3819 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

Circle 674 on Inquiry Card—Page 245

Says George Edwards, president,
WOODRUFF & EDWARDS, Elgin, Illinois

"Producing top-quality alloys . . . up to 14 heats per day"

with DETROIT ROCKING ELECTRIC FURNACE

In its 15-hour day, the Woodruff & Edwards foundry gets as many as three stainless steel heats, plus ten or eleven other heats, such as ductile iron, Ni-Resist or Ni-Hard.

The 89-year-old foundry entered the alloy metals field two years ago. Says foundry president George Edwards, "We installed a Detroit Electric Furnace as the least expensive way . . . only one-third the initial expenditure required for any of the other alloy production system installations."

Ted Haines, metallurgist in charge of the furnace, operates with two extra shells to eliminate downtime. Shell changeover from ductile iron to stainless steel is accomplished in fifteen minutes or less.

Production of 8,000 pounds of quality alloys per day has repaid nearly half the furnace investment in two years. "This has pleased the front office," says Haines.

☼ ☼ ☼ ☼ ☼ ☼

Detroit Rocking Electric Furnaces are doing many foundry jobs well—melting bronze, brass, steel, iron, ductile iron and other alloys. Detroit's indirect arc provides fast, controlled melting. Automatic rocking control assures homogeneity of the melt and greater utilization of heat. Molten metal is washed over a large area of the refractory by the constant rocking action.

Detroit Electric Furnace capacities range from 10 to 10,000 pounds. Send us your operating data—let our engineers show you how a Detroit Electric Furnace will meet your needs.

DETROIT ELECTRIC FURNACE

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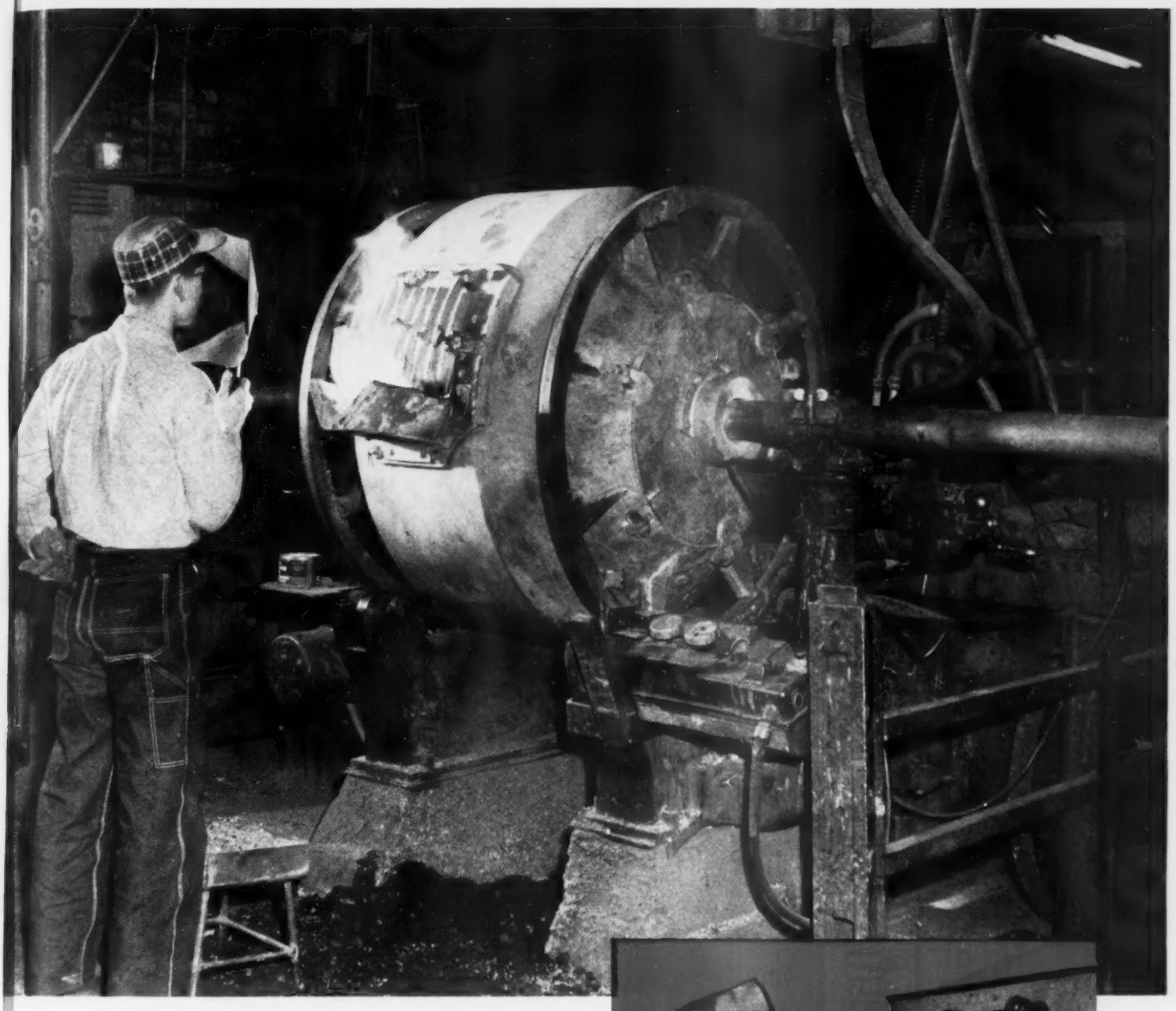

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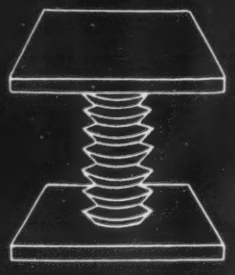
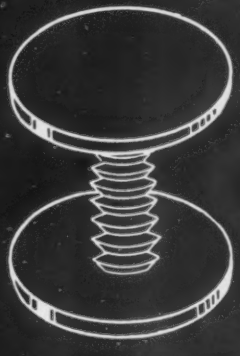


STEM DIA.
1/8" to 1 1/4"



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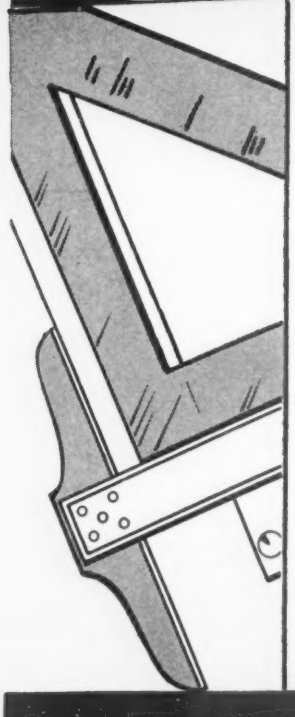

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Circle 676 on Inquiry Card—Page 245

Patternmaking Memories—More Who Left the Bench

Careers of More Men Who Went into Other Fields

By Dewar Forbes

PATTERNMAKER Emil Seidel had a varied career. He was born in Schuylkill County, Pa., on Dec. 13, 1864. As a boy he was taken by his parents to Milwaukee, where he served his apprenticeship.

Stove patternmaking was still a big thing in those days, and young Seidel took a particular liking to wood carving. He liked it so much that after finishing his apprenticeship and working a year or so as a journeyman, he went to Germany. For six years he worked at his trade during the day and at night attended the noted Kunst-Gewerbe-Schule of art craft in Berlin. On his return to Milwaukee, he opened an interior decorating business.

The call of the corebox got him after a year or two, however, and he returned to patternmaking. He was designer and patternmaker for Fuller-Warren Stove Works for seven years.

Then he left this job to start his own business again. He operated his Milwaukee Pattern Works for many years, with great success and ultimately was elected mayor of Milwaukee.

In Gregory's *History of Milwaukee*, Vol. IV, pages 41-42, after a long description of Mr. Seidel's success as mayor, it is stated: "It was at the patternmaker's bench, where care and absolute accuracy are required, that Mr. Seidel developed the habit of doing everything with all his might and with the determination that the task should be an expression of his best efforts."

Becomes Supplier—E. R. Kindt, president, Kindt-Collins Co., Cleveland, has dedicated his business to research development and services to foundries and pattern shops. Kindt-Collins Co. is the result of the success of a patternmaker who saw a future in a supply business of this kind. Mr. Kindt worked as a journeyman patternmaker at a time when many pattern shops were little more than dirty, unsanitary sheds or unwanted corners of a manufacturer's plant.

He decided to work toward the introduction of better methods, equipment and supplies. In 1914, his company was organized, and

from a humble beginning, it has developed into one of the largest pattern supply houses in the country.

Attracted by the Soil — Patternmakers, like most other people, often yearn to settle down on a farm, and one such patternmaker gave in. William Mann was working at the bench on the eastern sea-coast when he decided to get himself a farm in northern Ohio. From available evidence, Mr. Mann's agricultural experiences resemble those graphically described by Stephen Leacock: In good years he produced seed for the next year's crop.

In a few years, he was back at the bench in a rundown foundry at Martin's Ferry, O. He became the owner in a very short time, modernized the plant and ran it with considerable success for thirty years. Mr. Mann specialized in castings for heavy industries and built a reputation for fine workmanship.

Another ex-patternmaker farmer, one who seems to be on the road to more success on the farm, is Charlie Swartz, who became interested in the Central Valley project in California.

This project sends water from Mt. Shasta and other high points in central California some 450 miles, in part through man-made canals, for agricultural and other uses.

Today, Mr. Swartz, who began in a small way, has more than 300 acres in tomatoes. He harvests more than 20 tons per acre and finds a ready market for them at Heinz Co. processing plants at Tracy, Calif.

A Musician of Note—A patternmaker friend has advised me that in my March article I did not fully cover the multitudinous activities of Ed Leslie, at present pattern checker at Pelton Water Wheel Co., San Francisco. Ed seems to be a Jack-of-all-trades and master of them all, too. He was conductor of the 56-piece Bethlehem Steel Co.'s band in World War I. Later, until World War II, he was director of his own Student Art Center, with a staff of eight assistant art teachers. He organized and directed the Oakland Symphony for eight years, during which it gave more than 250 public concerts.

Mr. Leslie had his own radio orchestra for some years and did considerable radio work. He conducted the Silver Band of Alameda Native Sons Parlor, organized and conducted the Scottish Rite Little Symphony Orchestra of 60 members for many years and also played viola with the San Francisco Bohemian Club Symphony. While associated

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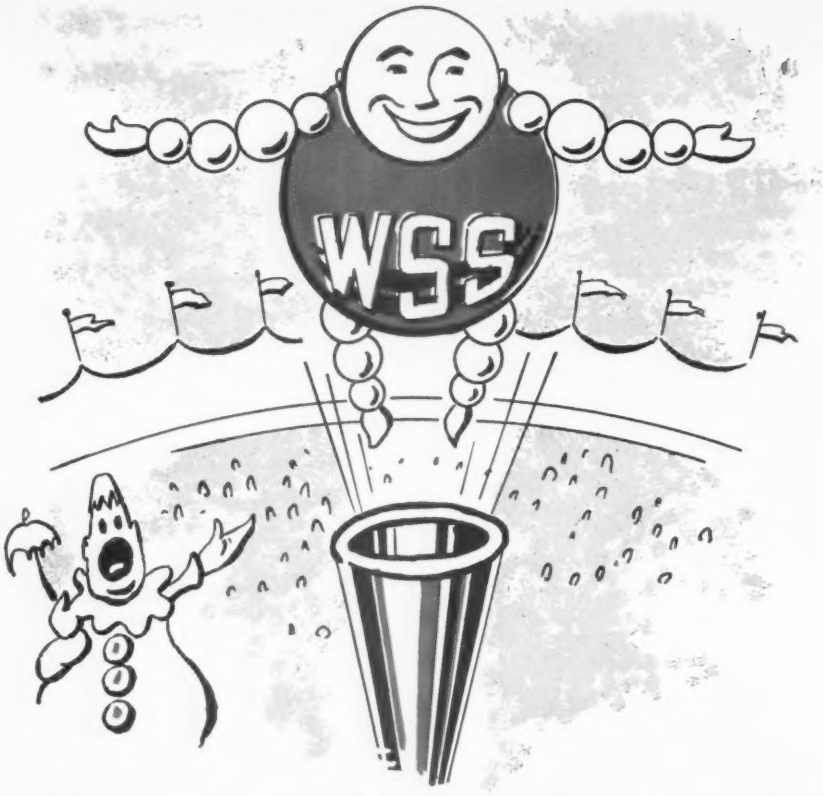

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Circle 678 on Inquiry Card—Page 245

with the printing business, he wrote the "Hi-Light" column for the San Francisco Advertising Club.

Mr. Leslie is given credit for much help by Joe Palange, a patternmaker who went to the top in a musical career. Mr. Palange, a patternmaker from San Leandro, California, worked at the bench in Union Iron Works and at other plants in the San Francisco area, including Peter Caird's Santa Rosa Foundry, described in FOUNDRY about a year ago. And all the while he was playing almost all orchestral instruments.

After doing amateur playing for some time, he stepped out as professional over 30 years ago. His first fee was $400 per week. In 1928 he went to New York and was a top-notcher in many leading shows. He returned to California in 1930 and joined NBC. Eight years ago he went to Hollywood and for seven years was with Universal Pictures, where he took leading musical roles in "Father Knows Best" and other pictures. He also did work for CBS.

Mr. Palange now is retired, although well under three score years. He owns a fine apartment building in Los Angeles, plays golf and catches the big ones in Mexican waters. He has an up-to-date woodworking shop, well equipped with machine tools. He likes to make small experimental patterns and figure out mass production methods for foundries. He still likes the smell of the foundry, and is toying with the idea of a brass foundry.

When time permits, he makes all sorts of knick-knacks of wood and enjoys doing plumbing and repairs and general maintenance work about his own apartment building.

From Coreboxes to Blackstone—At least three patternmakers in my book made a transfer from coreboxes to Blackstone. Peter Haberlin served his apprenticeship in Detroit, worked as a journeyman there and came to San Francisco about 45 years ago. After working in several shops, during which time he began to study law, he went to Portland, Oreg. In a few years, while still at the bench, he was admitted to the bar in Oregon. Although he is well over three score years and ten, he still is in active practice as a patent attorney, as he has been for 25 years.

The late James Campbell, Chief Justice of Oregon, began foundry and pattern work as a young man when he came from the east to Oswego, Oreg. Rube Strauss, his foreman, seemed to think that Jim possessed qualities which would fit him

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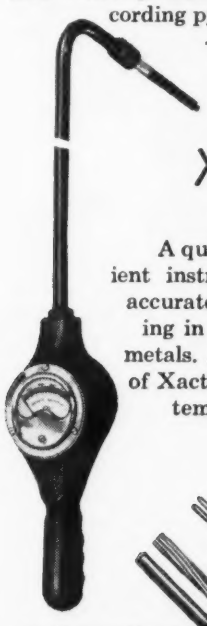

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for the law, and he bought Jim his first law books.

In a short time, Jim, who was an apt student, passed the Oregon bar examinations. After he had gone to the Spanish-American War, and returned as Captain Campbell, he hung out his shingle in Oregon City. Later he was elected Superior Court Judge of Clackamas County, Oreg., and served so well that he was promoted to the Supreme Court, where he later became chief justice.

Judge W. J. Hennesey of the Oakland Municipal Court, who passed away in 1936 at 69, spent half of those years at the patternmaker's bench. He was born in Oakland and worked in San Francisco and the East Bay area. Later he was appointed court clerk and, after a period of burning the midnight oil on that job, he passed the bar examinations. He was a prosecuting attorney, and later became Judge Hennesey.

Hobby Becomes Profession — At least one patternmaker took up astronomy. Mr. John Brashear, while he was working at the bench, began the study of astronomy as a hobby. He became a well-known amateur astronomer. This activity led him to a special study of telescopes and then to the making of them. He made the 38-in. Allegheny telescope for Sproul Observatory of Swarthmore College, Swarthmore, Pa., and, among others, the 72 in. reflector for the Victoria, B. C., Observatory.

Some 35 years ago, Charles Lux came from Chicago to a Berkeley, Calif., firm as a patternmaker. In a few years he began a small job shop of his own. Later he went into partnership with Victor Andre, and they moved into larger quarters as the A & L Pattern Works, Berkeley.

Some years ago, Mr. Lux obtained an interest in Berkeley Brass Foundry, and two years ago he disposed of his interest in A. & L. Pattern Works and obtained complete ownership of Berkeley Brass Works, in association with his son, John, who also is a patternmaker. A modern pattern shop 50 x 100 ft was erected recently, with every possible woodworking machine suitable for patternmaking, and the foundry building has been completely modernized.

Several other patternmakers were suggested to me, but I have been unable to contact them. Among them are J. D. Wallace of Chicago, credited with being the creator of bench planers; and Ole Evinrude, of Wisconsin, of outboard motor fame.

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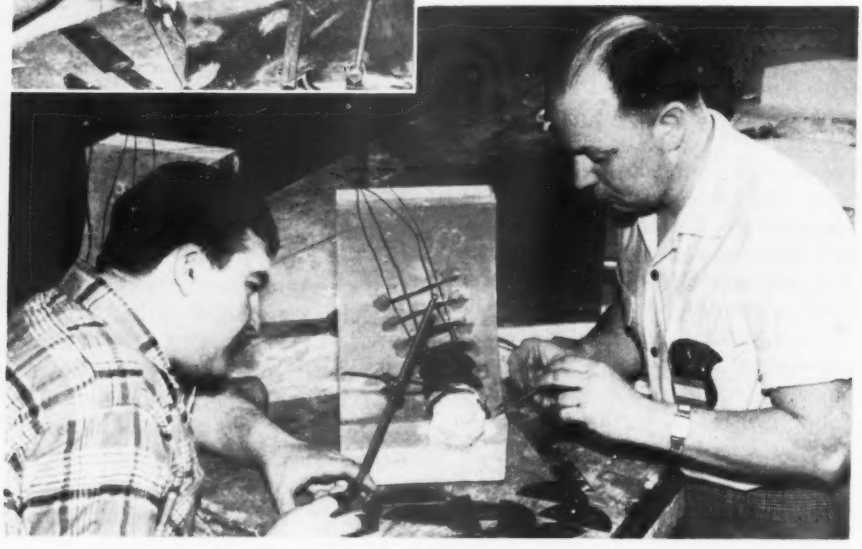
Shrinkage of finished product must be considered when templates are laid out. Here workers prepare shrink templates from smaller masters

Aircraft Dies Made with Plaster Patterns

By GEORGE E. TOLES

Left—After the plaster has hardened around the templates, trim lines are put on a small mock-up

Below—Templates forming skeleton of pattern must be dimensionally checked and adjusted. They are strengthened with plaster-coated burlap, then filled with plaster



Clay retaining wall is readied before cast is made for large mock-up. Worker on right smoothes rough edges of base of nearly completed job

BECAUSE plaster will not warp or shrink when it comes in contact with damp foundry sand, it is used in preference to wood in making patterns for Kirksite dies at the plant of Bell Aircraft Corp., near Buffalo. The completed patterns are used by foundry personnel to prepare dies used to form aircraft parts on giant drop hammers.

Fifteen employees are assigned to the plaster pattern department, and a skeleton crew also works on the second shift.

Use Templates as Masters—A plaster pattern is born on the drawing boards in the mold loft. There, templates are designed and later are delivered to the plaster section. These templates are used as masters from which other, slightly larger templates are made to allow for shrinkage in the finished product.

The final templates are wired into a skeleton of the patterns, then strengthened with burlap dipped in plaster. More plaster is shaped to the contours of the surfaces, between the templates, to form a model of the actual part that later will be made from the dies.

The plaster is mixed in small quantities so that it will not harden during the time it is being molded around the templates. Hardening occurs in about 20 minutes.

Build Plywood Walls—Plywood walls next are built around the model. From these, the pattern is molded with plaster mixed with sisal fiber, a product not unlike thin strands of hemp. This fiber helps to hold the plaster in place and to strengthen it after it has hardened. The pattern is about 1 in. thick, and the center is hollow.

The plant uses about 5 tons of plaster a month, in addition to clay, burlap, wire and sisal fiber.

After a pattern has been completed, the part number is placed on it, a thin coat of shellac is applied, and it goes to the foundry. Operations of the plaster pattern, drop hammer and foundry departments are closely related.

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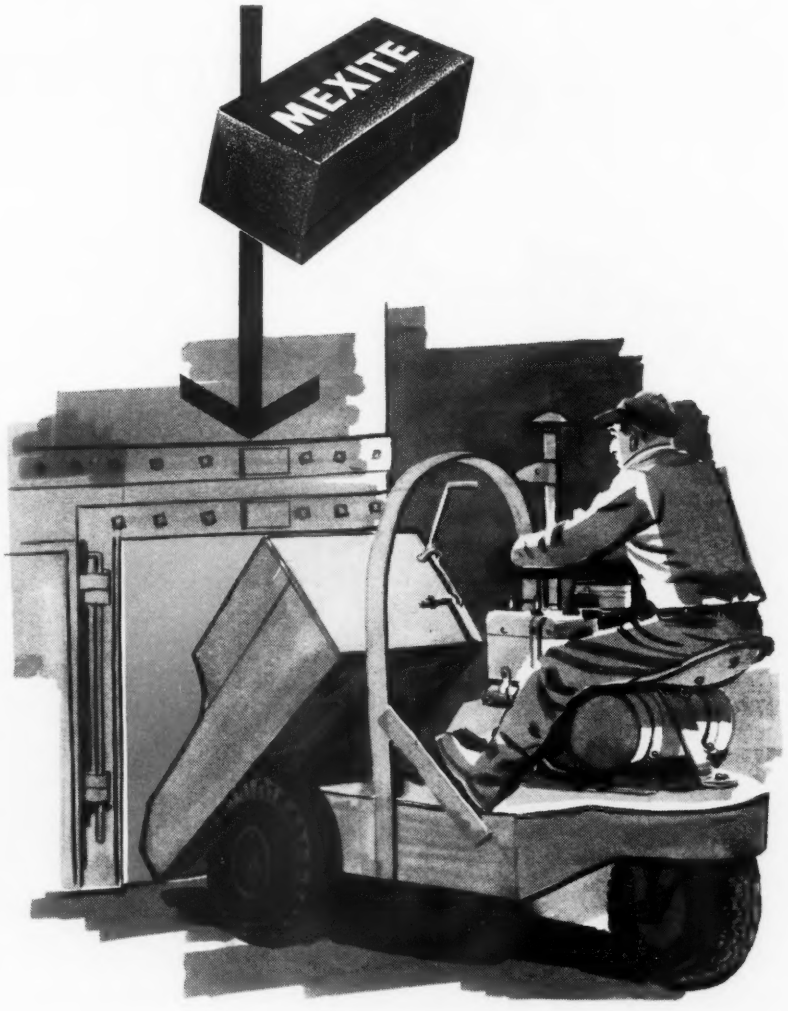

Mexite briquettes, composed of 70% graphitic carbon, provide foundrymen with a positive method of raising and stabilizing the carbon content of cupola charges and at the same time reduce the cost. Larger amounts of scrap can be used with resultant savings in charging costs. For example, if 400 lbs. additional scrap is charged, four Mexite briquettes will retain the same carbon analysis at a savings of $2.43* per ton of charge.

Mexite briquettes help produce better castings because they permit accurate carbon control. Mexite helps assure lower chill and hardness, and provides better fluidity and machinability thus increasing useable metal yield and cutting scrap loss. Mexite briquettes are packed 90 lbs. to a carton for easy handling and storing. We'd like to show you what Mexite can do in your foundry . . . write us today for a specific recommendation made for your particular area. We'll also send along our newest bulletin that will show you how Mexite can help keep your costs down where you want them to be.

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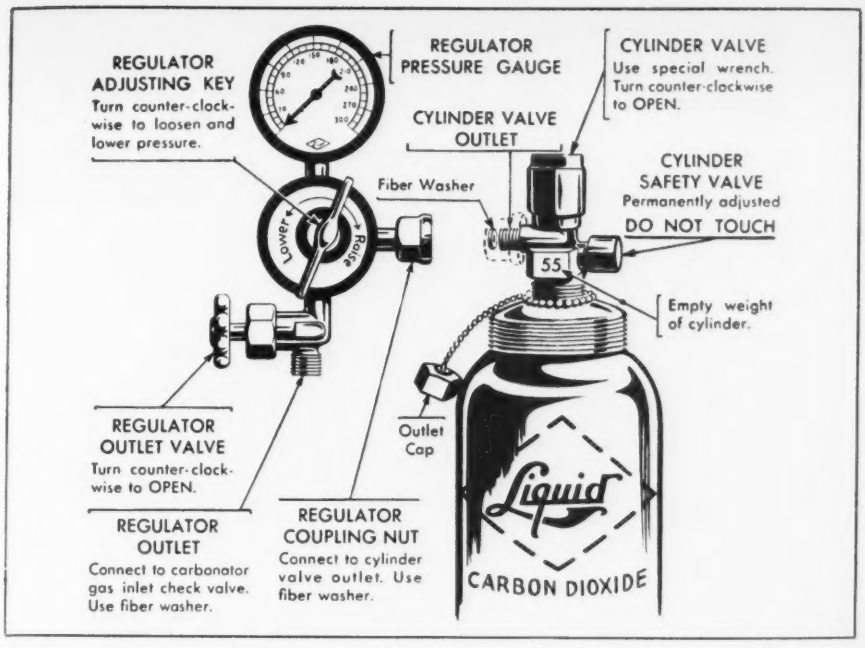

Sketch shows equipment which is used with cylinders of CO_2. Operation and maintenance of these parts is discussed in detail in this article

How to Handle

CARBON DIOXIDE

By WHEELOCK BIGELOW JR.
Assistant to the Sales Manager
Liquid Carbonic Corp.
Chicago

THE PROCESS of hardening foundry cores with carbon dioxide is growing in popularity every day. A number of foundries already are using the CO_2 process for all cores. Others are using it on a large percentage of their cores, and others still are experimenting or waiting to see the results of other operations before making any changes.

This use of carbon dioxide in foundries has introduced a new commodity with which few are accustomed to dealing. Some pointers on the use of CO_2 therefore may be of help.

Pressure Is High—First, it is important to remember that we are dealing with a compressed gas which is stored in steel cylinders at high pressures. This pressure increases proportionately with the ambient (room) temperature. At 70°F, the pressure is 840 psi; at 80°F, it is 940 psi; and at 90°F, it is 1060 psi. Cylinders are tested for 3000 psi, and the safety disk will burst at 2200. It is important, therefore, to keep the cylinders out of the hot sun and away from heated areas, like those near ovens or furnaces.

It is interesting to note that, unlike most other gases, CO_2 is stored in a cylinder in its liquid form. As the vapor is drawn off the top, the liquid vaporizes because of the heat pickup from the atmosphere. Room temperature will vaporize about 4 lb (34 cu ft) per hour in a 50-lb cylinder. If more gas than this is required, it is necessary to manifold two or more cylinders together. Increasing the outside temperature of the cylinder would help to increase the flow rate, but the only heat that should be applied is a warm water bath with a maximum temperature of 130°F. Even this temperature can develop pressures in excess of 1700 psi. in a full cylinder. Because of the intermittent use of CO_2 in the foundry application, we do not recommend the use of a water bath. If the cylinder does frost or freeze, *do not use a flame* to thaw it out.

The CO_2 cylinder valve is similar in appearance and operation to other cylinder valves. The hexagonal cap

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All-day operation at high temperatures has proved that *IRONTON* CARO-LINE can deliver superior service in any malleable iron or electric steel ladle. One Ohio malleable foundry pouring iron at 2860° F. fills its 250 lb. ladle 120 times before relining. The economy key is in the thickness of the lining—only ¾ of an inch! If you melt

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Down goes your reject rate as PARASPRAY deoxidizes the mold cavity atmosphere and stabilizes moisture content. Quick-drying PARASPRAY prevents costly blows, kicks and rat-tails . . . gives a s-m-o-o-t-h finish.

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covers the outlet connection where the regulator or manifold should be connected. It should be replaced when the cylinder is removed from the system. This precaution protects the valve threads. The round cap is the safety and never should be removed or tampered with. *Always close the valve on empty cylinders.*

Operating a Gas Regulator—It is important at this point to explain the directions for connecting and operating gas regulators. *Caution:* Loosen the regulator adjusting key before attaching regulator to a full cylinder.

A regulator handled with proper care will give long, trouble free service; it is a sensitive device and easily can be injured.

To connect a regulator, follow these steps:

1. Replace the fiber washer inside the regulator coupling nut and screw the nut to the cylinder valve outlet. Pull the nut up tight. Use a fiber washer at each CO_2 connection. Don't use old, scored fiber washers.

2. Be sure that the regulator adjusting key is loose, then make certain there is no tension on the spring operated by the key. If there is tension, turn the key counterclockwise until it is loose.

3. Close the regulator outlet valve by turning it clockwise.

4. Using the special key wrench or hand wheel, open the cylinder valve slowly, counterclockwise, to wide open.

5. Slowly turn the regulator adjusting key clockwise to the gage pressure.

6. Open the regulator outlet valve by turning it counterclockwise to wide open.

Cylinder Replacement — To replace a cylinder:

A word to the wise—
take care of your eyes

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A NEW PUBLICATION FOR FOUNDRYMEN

First Issue

SEPTEMBER 1956

We announce a new publication serving the foundry industry!

- —beginning this month, The Penton Publishing Company will edit and distribute a special digest report on equipment and supplies believed to be of particular interest to foundrymen.
- —it will be designed to keep foundrymen posted on latest developments in equipment and supplies, in a form to facilitate the reader's obtaining more data on descriptions of special interest.
- —supplementing FOUNDRY's complete editorial service in providing practical and technical articles and news for casting producers, this new publication will expand FOUNDRY's reporting of "what's new?" in equipment and supplies.
- —*FOUNDRY Equipment and Supplies DIGEST* will be published every-other-month on the 15th. It will be mailed on a selective, controlled basis to foundrymen and other selected readers in the metal casting industry.
- Distribution of first issues will be made to foundry management and production personnel in the United States and Canada. We will be happy to send sample copies on request.

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IT LASTED TWICE AS LONG...

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1. Close the cylinder valve by turning it clockwise.
2. Close the regulator outlet valve by turning it clockwise.
3. Turn the regulator adjusting key counterclockwise until it is loose.
4. Unscrew the regulator coupling nut from the cylinder valve outlet.
5. Replace the outlet cap. This cap is just as important on returning empties as on full cylinders. Replacing the cap will prevent damage to the outlet connection threads and will help suppliers give you better service by keeping cylinders in good repair. To avoid confusing capped empties with full cylinders, chalk MT on the cylinder after replacing the outlet cap.

Replace the empty cylinder with a full one and attach the regulator.

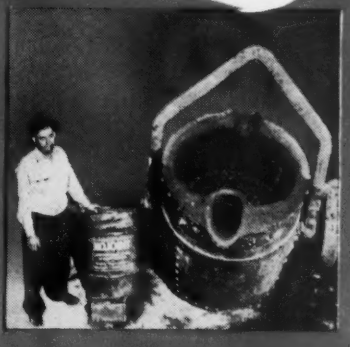
The regulator may freeze up. This condition causes an intermittent flow of gas and sometimes completely stops the flow. This is the first indication that you are drawing too much gas from the cylinder. The best way you can prevent this problem is to manifold more cylinders together. It also is possible to use a small CO_2 gas heater in the line, before the regulator, to prevent the regulator from freezing. Don't use a flame on the regulator to thaw it out.

Other equipment for storing CO_2 includes the dry ice converter and the bulk storage system. This equipment is, however, usually leased by the CO_2 supplier and is sized to handle the volume the foundry will require. The CO_2 serviceman also will advise the foundry on the recommended hook up at the time of installation. This article is intended therefore, to cover only cylinder CO_2, so that a foundry will be in a position to set up its own operation in a safe and practical manner.

"Gentlemen, I have been invited to say a few words about aluminum castings . . ."

NOJOINT lasts 26 months

where other linings for LADLES average only 1 month's service



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from A. W. Varnon at Goslin-Birmingham Mfg. Co. proves the outstanding economy of *IRONTON* NOJOINT, the plastic refractory for all-around foundry use. In ladle No. 3, 12,000 lb. capacity, the NOJOINT lining lasted 26 months while handling 5200 tons of gray iron. In all that time, there was no patching or maintenance on the sides or bottom of the ladle.

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Mr. Varnon put $30.00 worth of NOJOINT in the ladle, so his cost per ton of metal handled is $.0056. If that is the kind of economy you want, switch to *IRONTON* NOJOINT now.

Ironton will send a "MAN WHO KNOWS" to help your foundry men put in a NOJOINT lining. Call or write today.

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IRONTON, OHIO
1323 Ashtabula Street
Reliable Refractories

Write for name of nearest Ironton man, or telephone Ironton 109

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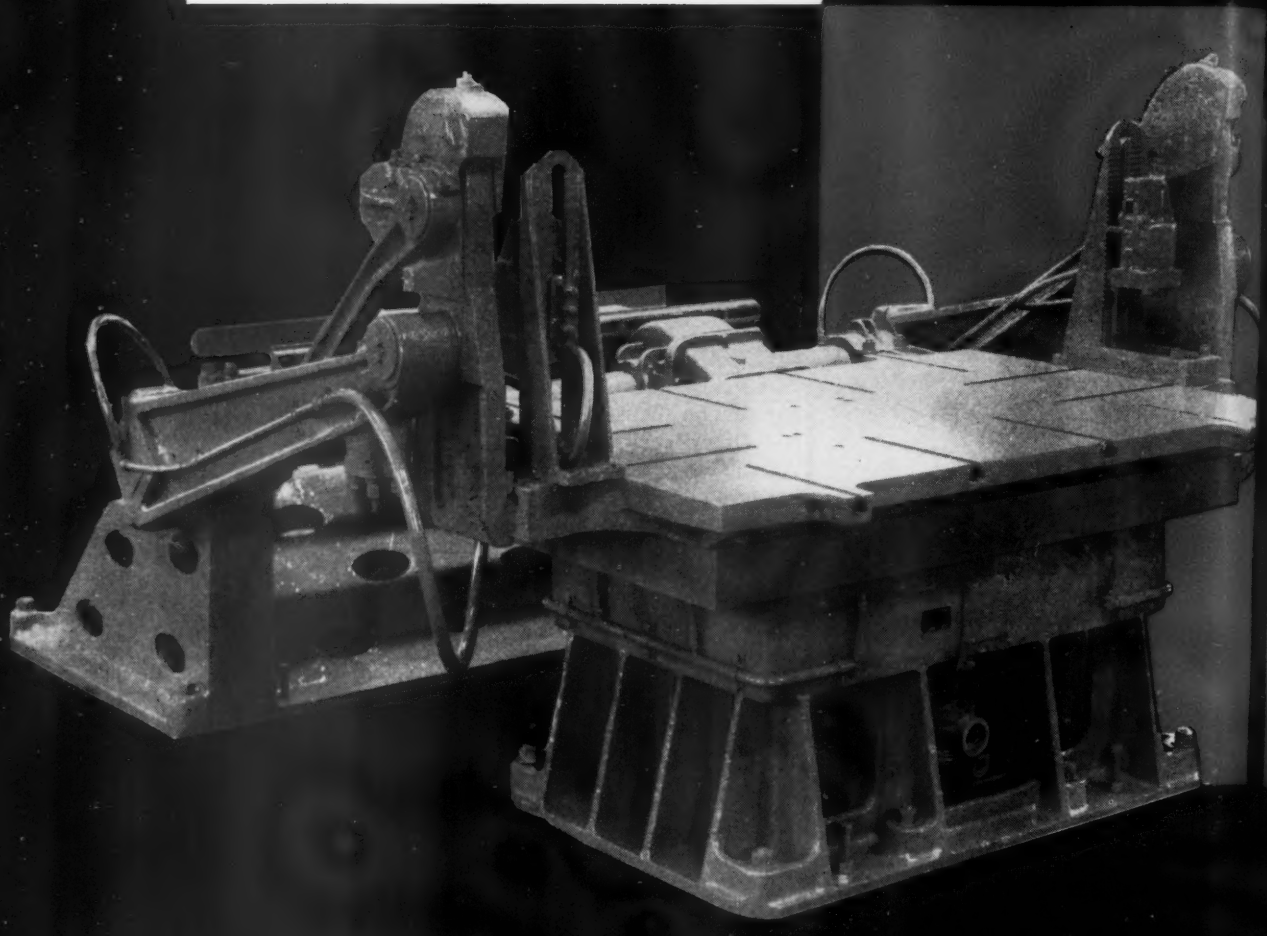
Cushioned for HEAVY-DUTY *punishment*



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The Herman 3000# jolt rollover and draw machine illustrated has been designed, engineered and built to meet your most difficult operation conditions.

Cushioned-action, air-on-oil hydraulic control brings this Herman machine to a stop smoothly and easily. All jerkiness in both pattern draw and rollover action is eliminated.

Rollover capacities range up to 40,000 lbs. and, like other Herman heavy-duty machines, rugged construction is a built-in feature of this unit.

No power is required for the rollback operation.

The machine is simple to use . . . a single valve controls all steps in the cycle . . . and it has extremely long pattern draw distance.

There is a Herman molding machine for every foundry operation. Write for more information today.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

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PEWTER CASTINGS

Produced with Antique Molds

By HAROLD E. BOURASSA

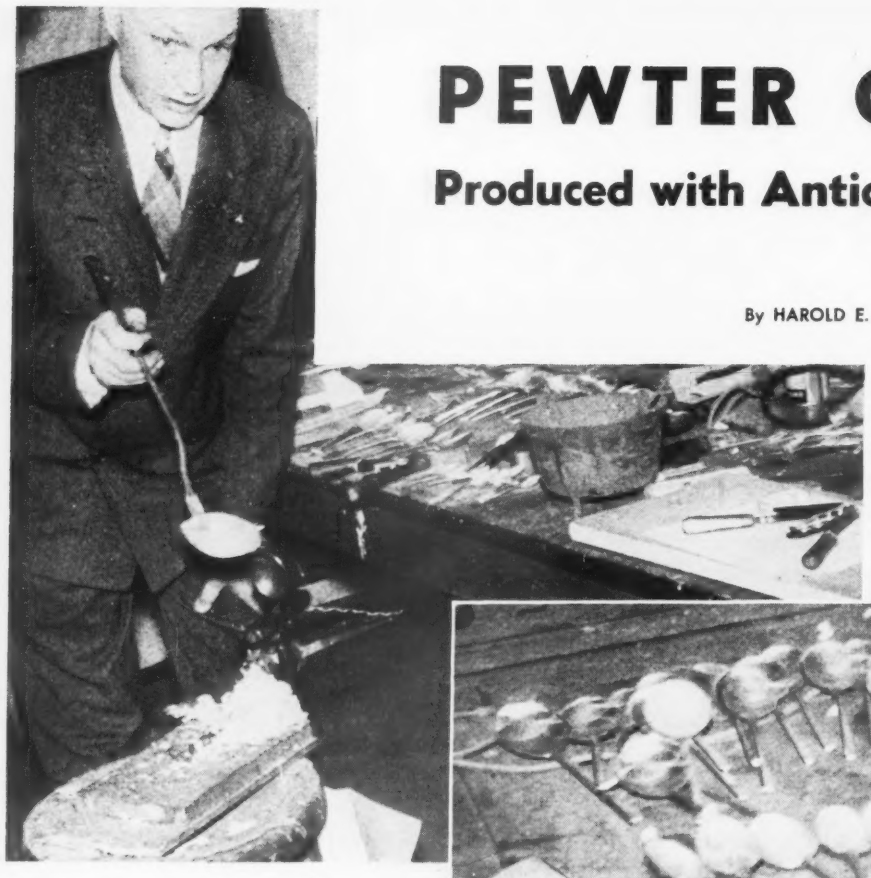

Fig. 1—Pouring a 16th-century type of slip handle spoon. At far right on the bench is mold used to produce pewter buttons

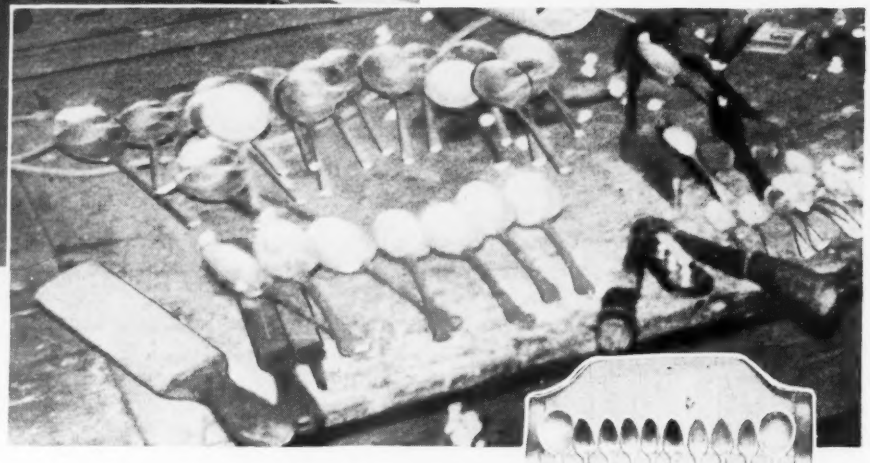

Fig. 2—Spoons, molds and, at right, the opened button mold

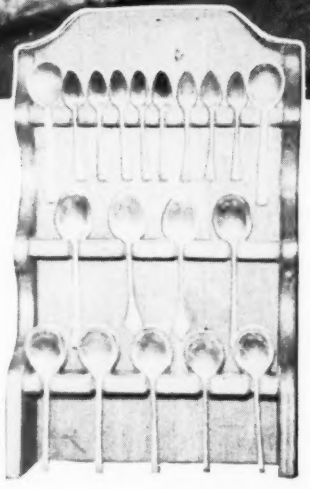

Fig. 3—Display rack shows off complete set of pewter spoons

THE neglected art of casting pewter got a new lease on life recently with the discovery of some brass permanent molds in Essex Museum in Salem, Mass. Director Russell L. Jackson decided to revive the ancient art of making pewter spoons and buttons with these molds, which had lain unused with thousands of other antiques for years.

The molds were designed and made in 1650 and are the oldest known brass molds made in America. They were little used and are in excellent condition. The British did not encourage public enterprise at that time and the mold designer, Richard Graves, was constantly discouraged from continuing his trade of pewter casting.

Two years ago, the museum decided to revive the art of making pewter spoons and buttons with its molds as an educational feature of the museum and also as a means of adding to the museum's collection of pewter utensils. The task was undertaken, and it proved to be such a successful venture that the museum now finds itself established in a small way in an industry that once was forbidden. The task of developing this project was undertaken by Ray Moore, custodian and master pewterer, who today is supplying antique seekers with these early spoons.

History of the Art — Mr. Moore successfully searched through the archives of the museum for information on pewter casting. Old England long had held a dominant place in the European pewter industry. Pewter is an alloy of tin and lead, brass or copper. These alloys, all known as pewter, were made into durable household vessels such as drinking mugs, pitchers, cups, tankards, beakers, dishes and ewers by Egyptians, Chaldeans, Greeks and Chinese before the ancient Romans left samples as souvenirs of Julius Caesar's conquest of England in the first century before Christ.

With the Gothic invasion and consequent disruption of the Roman Empire, pewter-making disappeared until 1000 A.D., and pewter was not mentioned in obtainable English records until 1076. In that year, the Council of Westminister granted permission for the consecration of pewter chalices for church services. Development of pewterers' guilds after 1473 standardized the quality and increased the production of various English pewters until three grades generally were recognized.

Types of Pewter—Fine pewter consisted of 80 per cent tin and 20 per cent brass or copper, an alloy gen-

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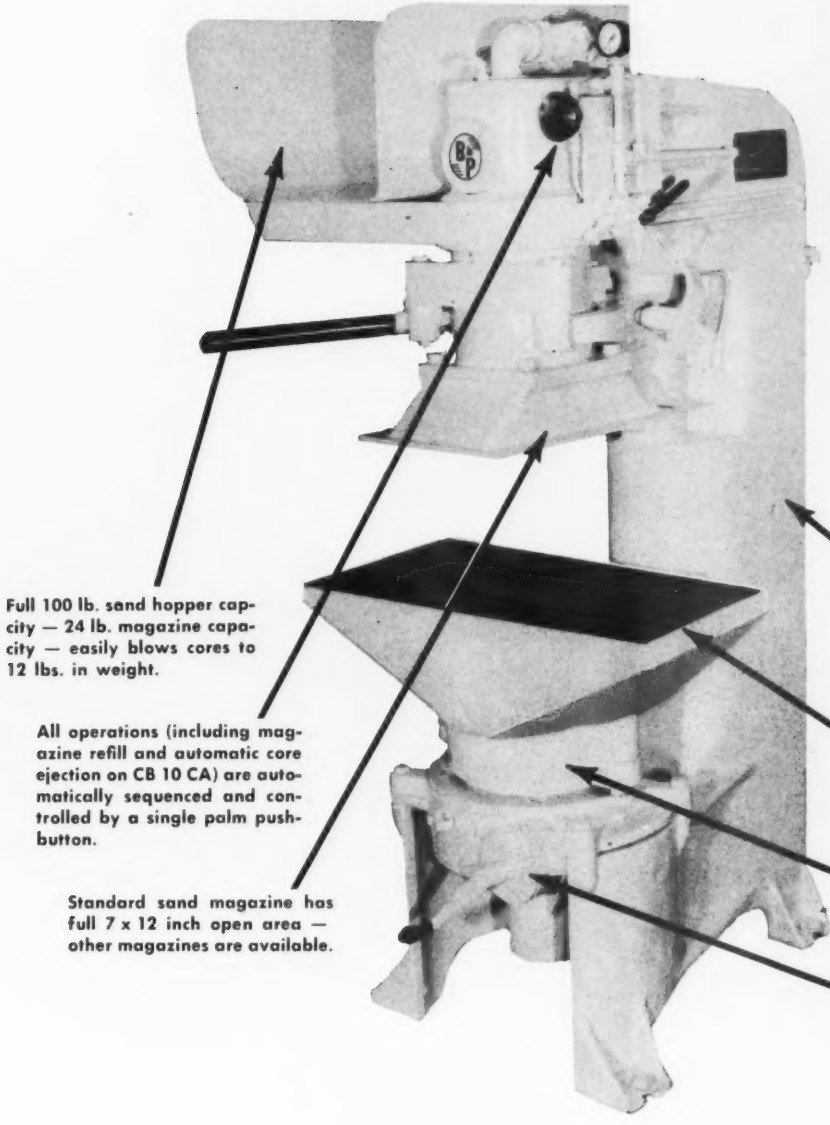
NOW! Push-button coreblowing for *jobbing* foundry cores to 12 lbs.*



CB 10 C FLEXIBLO

Full 100 lb. sand hopper capacity — 24 lb. magazine capacity — easily blows cores to 12 lbs. in weight.

All operations (including magazine refill and automatic core ejection on CB 10 CA) are automatically sequenced and controlled by a single palm push-button.

Standard sand magazine has full 7 x 12 inch open area — other magazines are available.

Rugged, all-cast construction ...strongest most rigid frame in the field.

11 x 32 inch table for handling large boxes — powerful air-on-oil side clamp available for vertically-split boxes.

Full 10-inch diameter draw cylinder with 4½-inch draw for handling boxes requiring a draw.

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CAPACITY No machine of similar size or cost matches the productive capacity of the CB 10 C Flexiblo. Here's a real production machine designed for jobbing or production foundry application. Every CB 10 C feature is designed to increase production and cut costs.

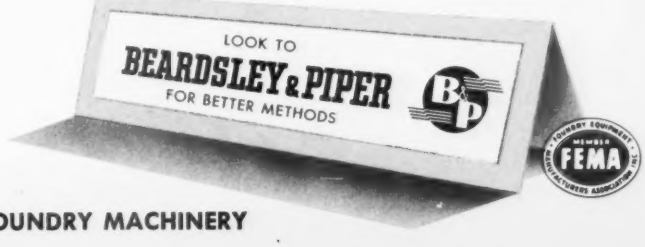
FLEXIBILITY This Flexiblo handles all types of core boxes — vertically-split, horizontally-split, or open face*— and with the CB 10 C quick-change blow plate, changes can be made in seconds. This Flexiblo is also fully adapted to the new "universal" blow plates.

LOW COST The CB 10 C Flexiblo is sold as a complete package, ready to operate. On the basis of production per dollar of investment, this blower is the best buy in the small blower field. Many special features designed to cut maintenance and downtime to a minimum mean further savings for you.

EASE OF OPERATION No other core blower approaches the Flexiblo for ease of operation. As with all Flexiblos, the CB 10 C combines safety and simplicity with push-button operation in the soundest blower design in the field. Automatic core ejector also available.

Write for Bulletin No. 5010 for the complete story

Most of your existing **wooden core boxes of good design as well as metal core boxes can be "Flexiblown"*



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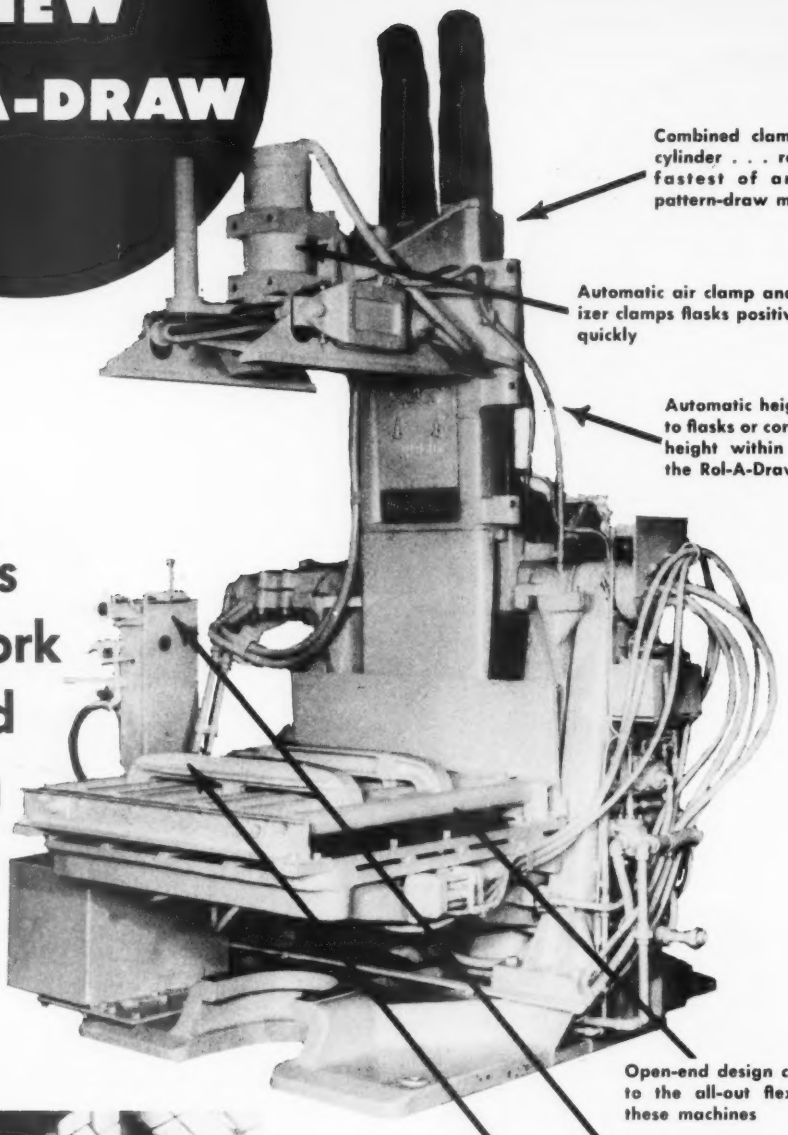
A NEW ROL-A-DRAW

that raises all standards for jobbing work molding and coremaking units


Combined clamp and draw cylinder . . . rollover is the fastest of any rollover pattern-draw machine
Automatic air clamp and equalizer clamps flasks positively and quickly
Automatic height adjustment to flasks or core boxes of any height within the range of the Rol-A-Draw
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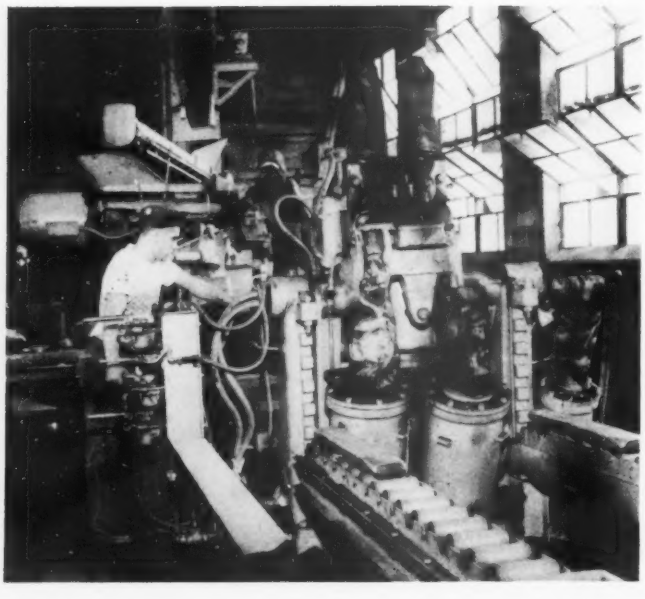
Pedestal mounting of all controls for convenience and simplicity of operation.
The most advanced pattern and core box clamp in the field — perfect for miscellaneous pattern jobbing work



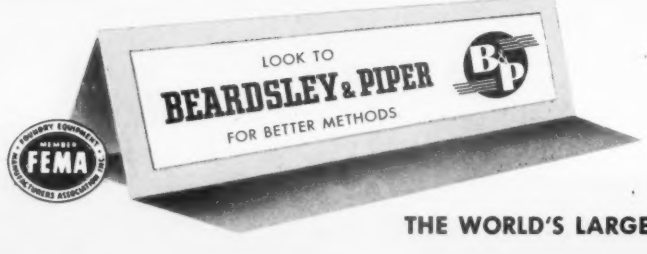
NEED ALL-PATTERN FLEXIBILITY? That's just what the Rol-A-Draw offers. Use existing patterns and core boxes — the Rol-A-Draw adapts itself to them.

NEED INSTANT FLASK HEIGHT ADJUSTMENT? No other machine adjusts to different flask or core box heights like the Rol-A-Draw. Adjustment is instant and automatic. An air-on-oil positioner and an automatic air clamp and equalizer assures instant adaptation to any flask height.

NEED A FAST CYCLE? None faster than the Rol-A-Draw. Combined clamp and draw cylinder and automatic cycle control assure minimum time cycles.

NEED CAPACITY? Rol-A-Draws offer capacities up to 10,000 lbs. They are ideally suited for installation with multiple-station slinger or other molding units.

Write for Bulletin No. 320 for full details



THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY

erally used to make dinner plates and similar articles because it had a smooth surface, attractive color and good strength. Holloware pewter consisted of 80 per cent tin and 20 per cent lead. It commonly was used to make teapots, coffee pots, tankards and other liquid containers, but because copper had a higher melting point than lead, it frequently was used for container bottoms. "Trifle" pewter consisted of 60 per tin and 40 per cent lead and was fashioned into beer mugs used in public houses. It was darker because of the relatively large proportion of lead and had a limited life because it was softer and easily damaged.

During later years, trifle pewter, its alloy changed to 83 per cent tin and 17 per cent antimony, was made by "triflers" into spoons, salt shakers, buttons and other articles which could not be finished on a lathe. During the 17th century antimony largely replaced copper in the manufacture of flatware. A good hard metal pewter contained more than 90 per cent tin, less than 8 per cent antimoney and 2 per cent copper. The alloy of 60 per cent tin and 40 per cent lead came to be known as "black pewter" and was used to make low-cost organ pipes and candle molds.

Pewter Casting Procedure—While casting various spoons and buttons, the museum follows the same technique used more than three centuries ago except that gas is used for melting. The formula which was used calls for 4 per cent antimony, 8 per cent copper and the rest pure tin.

That composition produced the finest quality of pewter known. At one time some pewterers introduced lead in their spoons, but it only tended to make them soft and easy to bend. Since the project began at the museum, more than 1500 spoons have been made and sold to persons seeking antiques.

Mold Coating—The mold is coated with lampblack, which prevents metal from sticking to the mold surfaces. The mold is heated to the proper working temperature and the metal poured into it. To determine the proper temperature of the metal, a piece of soft pine was placed in the hot metal. If it charred quickly, the metal was ready for pouring. Today, with thermocouple control, this antiquated method of determining temperature is, of course, outdated.

Although these spoons are much heavier than the ordinary spoons in a household, they will last indefinitely. The bulk of the work comes after the spoons have been cast. Surfaces are cleaned with a cloth wheel and filed and burred completely. Completing a spoon requires half an hour.

Produces Newer Designs

After his success with slip handle spoons, Mr. Moore successfully tried to produce fancier spoons, from other permanent molds of a later date. The newer designs include spoons known as Puritan, which first came into existence about 1690, and a round-ended spoon which came out about 1720. A demitasse spoon also was cast of pewter, the mold having been found among the antiques of Essex Museum.

The button mold shown at right in Fig. 1 is a product of the 16th century era. It also now is used to make pewter buttons for antique seekers.

The author wishes to express his appreciation to the Essex Museum, its director, Russell Jackson, and the custodian and pewterer, Ray Moore, who allowed him to photograph the permanent molds at the museum.

Cut foundry operating costs . . .

Transite Core Plates are strong and durable . . . resist warpage, impact and abuse, provide long service life.

with Transite Core Plates and Slip Jackets

"Johns-Manville Transite* Core Plates help assure maximum production in minimum time"—that's the experience of foundrymen who have used them for years. Made of asbestos and cement, they are light in weight, yet strong and durable. Being non-metallic, they resist corrosion, maintain their smooth surface and can be easily cleaned.

Transite Slip Jackets are a companion product with similar advantages. They do not burn, retain their original shape despite runouts. Slip jackets are furnished in both white and black types. The latter is widely used as a protective liner for metallic slip jackets.

FREE . . . New Folder gives complete details on Transite Core Plates and Slip Jackets—as well as Transite Pallite products for dielectric furnaces. For your copy of folder PP-31A, write Johns-Manville, Box 60, New York 16; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

Transite Slip Jackets cost less than other types . . . last longer, too. Result—important savings for foundries.

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES AND SLIP JACKETS

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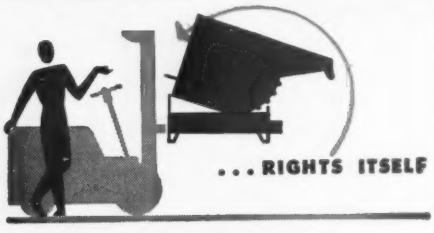

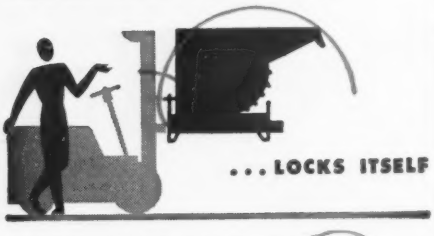

...and dares you to damage it.

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Obituary

WALTER O. LARSON, 55, founder and president, W. O. Larson Foundry Co., Grafton, O., died July 28, in a Montpelier, O., hospital of injuries suffered in an automobile accident near there. Mr. Larson, since 1952 treasurer and chairman of the finance committee of the Gray Iron Founders' Society, was chairman of its Northern Ohio Management Executives Group in 1949-50, and a director from 1950 to 1952. In 1954 he was presented a citation for outstanding service to the society and the gray iron industry. Prior to founding his own company in 1933, Mr. Larson was foundry manager, Hill Clutch Machine & Foundry Co., Cleveland, for 4 years. Previously he was general manager of Cuyahoga Foundry Co., and earlier was with American Range & Foundry Co., both of Cleveland.

WALTER O. LARSON

William H. Sayre, 57, president, American Abrasive Metals Co., Irvington, N. J., died June 29. Mr. Sayre was graduated from Lehigh University and Harvard Law School, and practiced law for 5 years until 1931, when he joined American Abrasive Metals Co., founded by his father in 1911. He was an active member of New Jersey Foundrymen's Association.

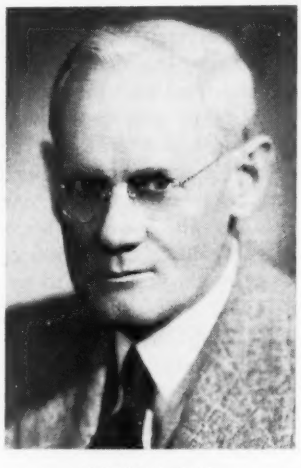
Dr. Oscar E. Harder, retired assistant director of Battelle Memorial Institute, Columbus, O., died July 10. Dr. Harder was in charge of metallography at University of Minnesota, prior to joining Battelle Institute in 1930. He was a specialist in physical metallurgy, heat treatment and allied subjects.

Thomas A. Moormann, 61, manager of the Forging and Casting Division, Allegheny Ludlum Steel Corp., Ferndale, Mich., died July 5. A native of Cincinnati, Mr. Moormann had been associated with the plant since 1929. He had been plant manager since 1934, except for a short period when he was in charge of the company's Los Angeles plant.

William F. Muth, 68, former vice president, National Bronze & Aluminum Foundry Co., Cleveland, until his retirement in 1948, died July 20. Associated with the company for 40 years, he was secretary from 1913 to 1941, when he became vice president.

Karl Grobschmidt, 57, general superintendent, Badger Malleable & Mfg. Co., Milwaukee, died July 2. A graduate of University of Wisconsin, he had been with the company for many years and had been general superintendent since 1942.

Robert E. Belt, 74, for 30 years secretary-treasurer of the Malleable Founders' Society, Cleveland, and its predecessor organizations, died July 25. Since his retirement from the society in 1946 he had been vice president, Columbus Conveyor Co., Columbus, O. Mr. Belt was graduated from Ohio Northern University and National University Law School. For two years prior to joining the malleable group he was in charge of the division of uniform cost accounting, Federal Trade Commission, Washington. In his post with Malleable Founders' Society, Mr. Belt devel-



ROBERT E. BELT

AIR CYLINDERS of many kinds are made by Schrader. One type is shown above and in the photo below. Here, used to exert a ton of force, the cylinder bends rods easily into shape. Schrader makes air products to fit needs of almost any operation. A few of them are indicated here in red (numbers 1 through 3).

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4 times as many burner grills per hour

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This kind of production help is typical of operations automated with Schrader Air Products. Every day, new ways of using air for automatic operations are being planned, tested, and integrated in many different kinds of manufacturing plants. Economy, efficiency, and safety are basic with air, and in many cases air has made the difference between profit and loss.

Schrader engineering facilities are available to help you. Upon request, Schrader engineers will assist in planning for the most efficient use of air in your plant. Outline your problem to us and we'll give you prompt help. Right now—send for the latest informative booklets which show Schrader Air Products that can increase production, at low cost.

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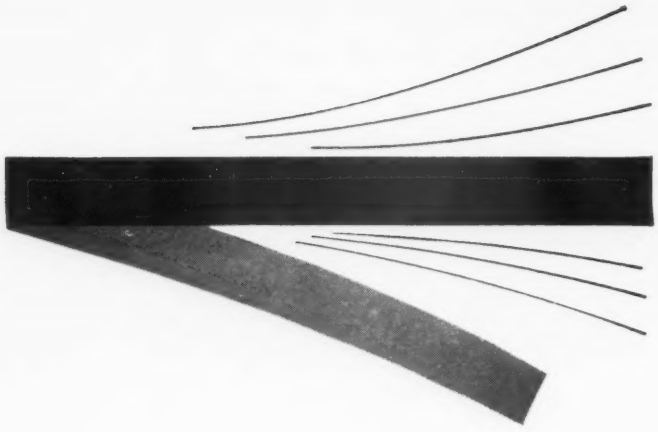

25,000 psi yield strength in aluminum castings without heat treatment

Federated's Tenzaloy, self-aging aluminum alloy, has an unusually desirable combination of properties, including exceptionally high yield strength, which is the best measure of ability to take punishment without failure.

Here are typical properties of Tenzaloy castings aged 10-14 days at room temperature:

Yield Strength, psi (.02% offset)	**25,000**
Tensile Strength, psi	**35,000**
Brinell Hardness Number	**74**

Tenzaloy has other unique properties that help make it the most widely used of all high-strength, self-aging aluminum alloys; it takes a fine anodized finish, it has excellent machinability, it has superior corrosion resistance, and it can be brazed by standard techniques.

Ask your Federated salesman to tell you how and where foundries are successfully and profitably using Tenzaloy. Or write us directly for a complete pamphlet on the alloy and its properties.

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oped a cost accounting system, standardized operating processes and practices to improve the quality of malleable castings, and contributed many articles to the technical press. He was also the author of a book on foundry cost accounting.

William J. Hall, 73, former works manager, Fahralloy Canada Ltd., Orillia, Ont., died July 4. Mr. Hall retired in 1945 but continued as a consultant with the company until recently. A native of the United States, he started his foundry career in 1903 with the predecessor company of American Manganese Steel, remaining with the organization until he went to Canada in 1935.

John Richard Avey, 47, since 1939 a partner in Avey Products Co., Tulsa, Okla., manufacturers' representative for chemical companies, died there Aug. 8. A number of years ago Mr. Avey was an advertising sales representative in the Chicago office of Penton Publishing Co., Cleveland, for *Iron Trade Review* and FOUNDRY.

William J. Koehring, 83, one of the founders and former president of the Koehring Co., Milwaukee, died June 23. Mr. Koehring was president of the company from 1906, when it was founded, to 1940 when he became board chairman. He retired in 1952.

Henry Ariens, 91, president, the Ariens Co., Brillion, Wis., maker of farm machinery, died July 16. He organized the company in 1933. In 1895 he founded Brillion Iron Works Inc., Brillion, Wis. and previously started the Morningside Foundry in Sheboygan Falls, Wis.

Chester H. Kimmel, 53, president, Ohio Crankshaft Co., Cleveland, died July 12. He joined the company in 1940, became vice president in charge of the crankshaft and camshaft department in 1946 and president in 1955.

Reginald Drant, 66, consulting and metallurgical engineer in the St. Louis area, died July 13. Mr. Drant, a graduate of Lehigh University, was one of the organizers of Sorbo-Mat Process Engineers, Clayton, Mo., consultants to many foundries.

Henry W. Beckman, 80, for many years general foreman of the brass foundry, Allis-Chalmers Mfg. Co., Milwaukee, died July 15. He joined the company in 1908 and retired in 1944.

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means sand the same every time

SPECIFY BLACKHAWK SILICA, THE SAND WITH HIGH RESISTANCE TO CHEMICAL AND HEAT ACTION. OVER 99.7% PURE BY ACTUAL TEST

Blackhawk silica has the same purity, uniformity, and dependability with every order and in any quantity. That's what Standard specification means to you, Mr. Foundryman, whose product quality depends on the ingredients you use.

Standard's silica is mined from an area wonderfully rich in tremendous deposits of St. Peter's sandstone. Painstaking washing and grading processes produce foundry sands second to none in the world.

The Blackhawk brand possesses an unusually high sintering and fusion temperature point plus marked permeability which allows free passage of gases.

Standard's accessibility to both excellent rail and water transport facilities affords swift delivery anywhere in the nation. For your next order of silica sand, phone the Standard distributor in your area.

BLACKHAWK SILICA SAND

The Blackhawk brand—used throughout the foundry industry as steel molding sands, special core sands, opening and parting sands, and facing sands.

STANDARD SILICA COMPANY

STANDARD
Silica Company
OTTAWA • ILLINOIS

Silica Center of the World

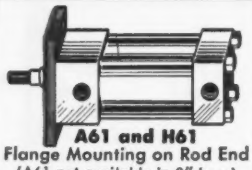
over 8,000 Different Cylinder SELECTIONS—

Miller AIR AND HYDRAULIC CYLINDERS AND BOOSTERS "IN STOCK" for immediate delivery

See Miller Bulletins A-105K (Air) and H-104K (Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.

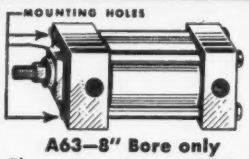
"IN-STOCK" MODELS

"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.

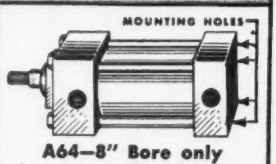


A61 and H61
Flange Mounting on Rod End
(A61 not available in 8" bore)

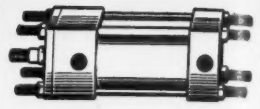
A62 and H62
Flange Mounting on Cap End
(A62 not available in 8" bore)



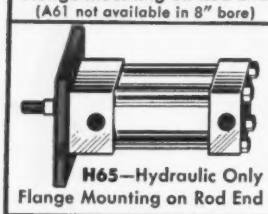
A63—8" Bore only
Flange Mounting on Rod End



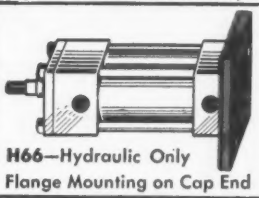
A64—8" Bore only
Flange Mounting on Cap End



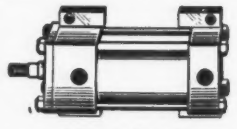
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



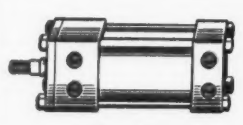
H65—Hydraulic Only
Flange Mounting on Rod End



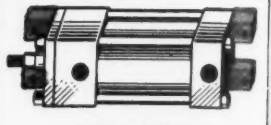
H66—Hydraulic Only
Flange Mounting on Cap End



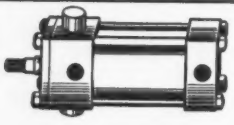
A72 and H72
Side Lug Mounting



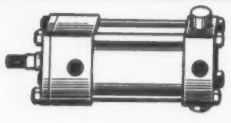
A74 and H74
Side Flush Mounting



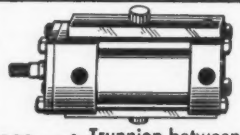
A77 and H77
Side or Foot Mounting



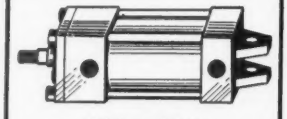
A81 and H81 Trunnion Mounting on Rod End



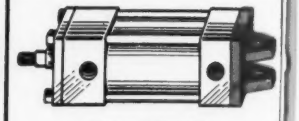
A82 and H82 Trunnion Mounting on Cap End



A83 and H83 Trunnion between Head and Cap (one week delivery)



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES In Inches

"IN-STOCK" STROKES (in Inches)

	Bores	Rod Dia.	Rod Turn Down & Threads		Strokes
AIR	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	6	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	8	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
HYDRAULIC	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1¾"	1¼-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	2"	1½-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36

(1) "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

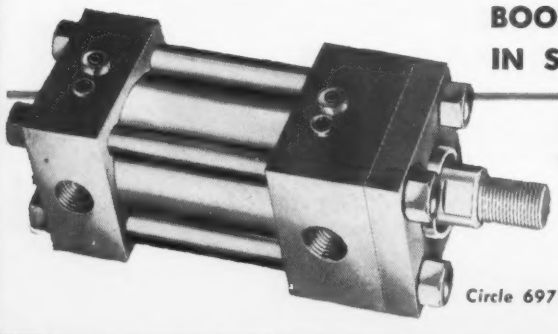
Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.

BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.



Write For Catalog and Stock Price List

Miller

MILLER FLUID POWER DIVISION
FLICK-REEDY CORP.

2034 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

Circle 697 on Inquiry Card—Page 245

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1954	624,973	158,473	214,408	245,291	.....
1955					
May	71,691	14,235	25,597	31,243	104,984
5 mo.	354,981	71,232	130,652	149,733	.....
June	68,473	14,920	24,682	27,939	102,799
July	55,033	11,716	21,006	21,656	101,024
Aug.	64,864	14,916	22,267	27,004	105,994
Sept.	67,069	14,769	23,075	28,532	111,696
Oct.	72,197	14,485	25,135	31,741	120,222
Nov.	75,065	14,327	26,267	33,852	126,954
Dec.	75,275	15,291	25,031	34,347	123,363
Total	832,957	171,656	298,115	354,804	.....
1956					
Jan.	74,152	15,861	24,528	33,253	121,924
Feb.	73,096	15,560	23,963	32,949	115,958
Mar.	73,785	16,597	22,816	33,965	110,642
Apr.	67,880	14,732	20,718	31,782	106,477
May	65,786	15,570	19,699	29,814	102,121
5 mo.	354,699	78,320	111,724	161,763	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1954	835,930	753,179	48,848	.....
1955				
May	85,008	76,064	5,513	49,198
5 mo.	408,826	367,424	25,590	.....
June	90,476	80,869	5,840	45,820
July	65,816	59,138	3,998	48,085
Aug.	87,206	77,721	5,322	51,251
Sept.	89,600	80,481	5,603	57,313
Oct.	91,192	82,958	4,513	56,751
Nov.	90,345	80,934	5,807	57,049
Dec.	88,287	78,327	6,368	57,146
Total	1,011,748	907,852	82,201	.....
1956				
Jan.	89,767	80,116	6,135	58,445
Feb.	91,706	82,244	5,888	57,515
Mar.	96,085	85,094	6,299	65,560
Apr.	90,679	81,333	5,835	68,106
May	89,188	80,105	5,448	58,789
5 mo.	457,425	408,892	29,605	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[3]
	Total	For Sale	Total	For Sale	Total	For Sale	
1954	812,016	461,982	.....	.....	.....	.....	.....
1955							
May	98,397	57,317	.....	.....	.....	.....	106,446
5 mo.	469,994	271,498	.....	.....	.....	.....	.....
June	99,456	60,261	.....	.....	.....	.....	107,559
July	75,570	44,914	.....	.....	.....	.....	115,420
Aug.	82,448	48,126	.....	.....	.....	.....	123,473
Sept.	87,215	55,471	.....	.....	.....	.....	116,636
Oct.	90,866	53,804	.....	.....	.....	.....	121,261
Nov.	99,280	58,069	.....	.....	.....	.....	116,981
Dec.	99,946	60,409	.....	.....	.....	.....	123,107
Total	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Jan.	93,562	54,618	79,406	45,747	14,156	8,871	116,520
Feb.	93,533	54,466	80,601	47,606	12,932	6,860	113,616
Mar.	86,941	46,266	75,384	40,869	11,557	5,397	106,491
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
5 mo.	437,494	253,467	377,747	220,095	59,747	33,372	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1954	25,777	22,950	.....
1955			
May	2,399	2,174	6,530
5 mo.	12,069	10,966	.....
June	2,367	2,098	6,346
July	1,920	1,763	5,912
Aug.	2,176	2,002	5,964
Sept.	2,478	2,260	5,670
Oct.	2,302	2,077	5,394
Nov.	2,325	2,148	5,805
Dec.	2,255	2,018	5,981
Total	27,892	25,332	.....
1956			
Jan.	2,959	2,600	6,237
Feb.	2,977	2,720	6,704
Mar.	3,046	2,842	6,414
Apr.	3,140	2,949	7,137
May	3,021	2,801	7,293
5 mo.	15,143	13,912	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	May 1956	Apr. 1956	May 1955
Ferrous	205,400	211,100	201,700
Nonferrous	62,300	63,500	64,000

Average Weekly Earnings

Gray Iron	82.82	85.07	85.77
Malleable Iron	81.20	83.23	87.47
Steel	96.32	95.22	86.74
Nonferrous	87.94	87.51	85.07

Average Weekly Hours

Gray Iron	40.6	41.7	43.1
Malleable Iron	40.0	40.8	43.3
Steel	43.0	42.7	41.7
Nonferrous	40.9	40.7	40.9

Source: Bureau of Labor Statistics

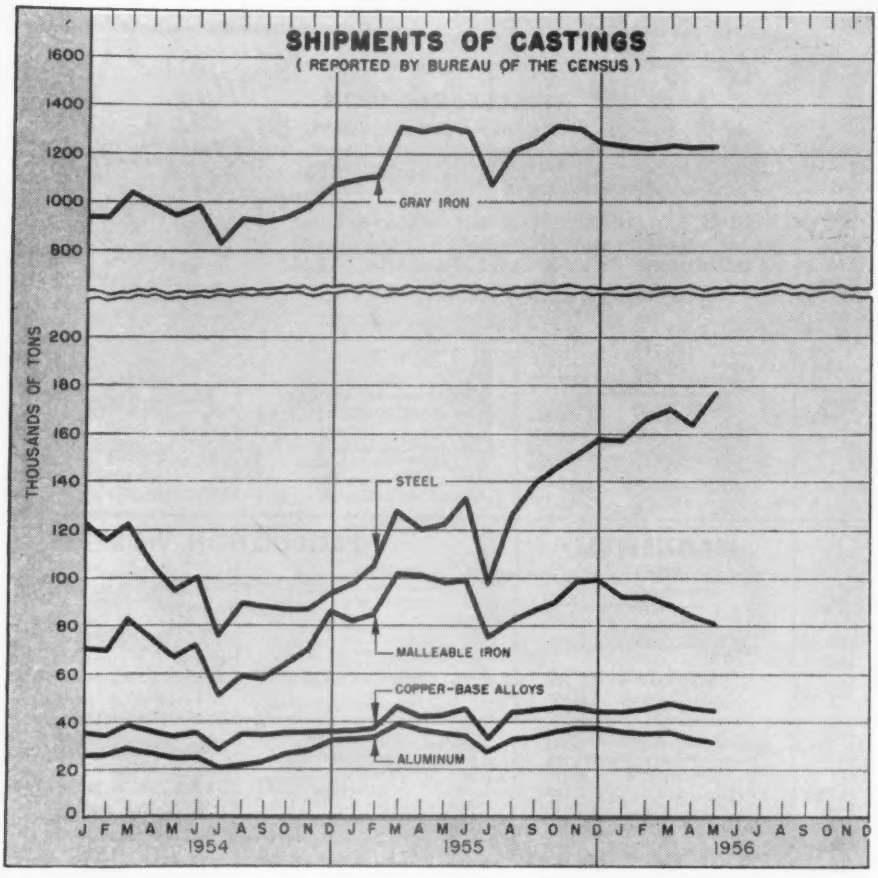
GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[3]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1954	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,711	.....
1955										
May	1,310,424	707,105	803,897	315,072	227,236	117,915	35,966	168,772	74,553	937,949
5 mo.	6,117,108	3,217,029	3,904,044	1,542,569	1,049,173	532,887	161,297	640,312	362,282	.....
June	1,296,196	715,862	793,067	327,520	228,044	117,727	43,807	147,351	83,927	981,918
July	1,069,711	579,122	634,869	246,297	210,130	112,137	28,181	129,191	67,340	1,049,565
Aug.	1,226,312	688,317	718,423	301,502	238,007	121,071	29,298	156,074	84,510	1,160,466
Sept.	1,252,736	712,688	731,073	314,223	244,199	124,811	29,953	165,332	82,179	1,150,933
Oct.	1,310,309	713,671	795,875	327,827	245,749	122,722	31,877	160,875	75,923	1,113,336
Nov.	1,305,633	696,523	797,854	327,580	262,506	127,739	29,795	148,560	66,918	1,061,546
Dec.	1,259,740	663,993	786,480	328,445	262,056	133,115	30,833	133,935	46,436	1,075,477
Total	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Jan.	1,249,518	677,017	769,826	326,269	257,150	132,581	32,408	131,346	58,788	1,157,818
Feb.	1,214,769	680,494	739,786	322,956	242,207	128,643	35,074	133,254	64,448	1,140,765
Mar.	1,255,405	715,173	752,498	331,749	254,045	139,624	42,676	132,384	73,802	1,162,578
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
May	1,247,761	749,681	702,239	321,288	243,719	131,294	38,544	171,859	91,400	1,086,122
5 mo.	6,185,453	3,524,510	3,683,458	1,617,230	1,233,607	662,615	188,027	720,513	358,848	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[3]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1954	1,184,096	880,158	135,581	802,321	580,474	120,309	381,285	303,428	15,315	.....
1955										
May	122,465	92,713	16,810	85,950	63,182	15,335	36,515	29,531	1,475	225,302
5 mo.	574,746	439,649	83,105	401,080	299,269	76,528	177,040	140,380	6,577	.....
June	133,887	102,457	19,591	93,417	69,986	17,979	40,470	32,471	1,612	251,416
July	97,875	71,170	11,631	68,094	48,140	10,666	29,781	23,030	965	354,628
Aug.	126,406	96,290	20,576	91,245	68,514	19,094	35,161	27,776	1,482	413,531
Sept.	140,843	107,622	23,594	100,775	76,156	21,991	40,068	31,466	1,603	420,616
Oct.	145,674	110,409	23,745	105,345	79,235	22,375	40,329	31,831	1,370	418,063
Nov.	152,381	116,908	25,635	111,571	84,064	24,050	40,810	33,518	1,585	453,113
Dec.	158,982	122,201	29,003	116,872	88,894	26,919	42,110	33,307	2,084	475,335
Total	1,530,694	1,166,706	236,880	1,088,489	814,258	219,662	445,769	354,452	17,278	.....
1956										
Jan.	158,618	123,343	27,954	116,092	88,480	26,362	42,526	34,863	1,592	519,401
Feb.	165,398	128,598	30,833	123,279	94,998	29,112	42,119	33,600	1,721	567,330
Mar.	170,045	130,839	31,991	126,583	95,779	29,953	43,462	35,060	2,038	594,990
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
May	178,227	142,025	35,949	134,919	107,575	73,850	43,308	30,984	2,254	608,275
5 mo.	835,996	649,820	154,202	622,596	478,164	184,609	213,400	168,190	9,778	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955
1956

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1954 ...	59,526,723	59,139,159	2,479,926
1955			
May ...	6,426,747	6,570,567	277,967
5 mo..	29,998,393	30,423,103	1,319,347
June ...	6,148,026	6,297,338	249,525
July ...	6,169,770	6,266,631	221,372
Aug. ...	6,395,422	6,439,101	249,425
Sept. ...	6,397,133	6,501,013	260,608
Oct. ...	6,630,609	6,813,118	283,818
Nov. ...	6,545,862	6,577,008	285,021
Dec. ...	6,865,032	6,949,073	284,936
Total .	75,150,247	76,266,385	3,154,052
1956			
Jan. ...	6,914,836	6,182,704	275,660
Feb. ...	6,476,135	6,506,044	260,949
Mar. ...	6,896,593	6,861,698	267,414
Apr. ...	6,633,363	6,572,836	247,664
May ...	6,733,286	6,595,144	239,193
5 mo..	33,654,213	32,718,426	1,290,880

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1955	1956
Jan.	25,291	27,736
Feb.	25,349	24,949
Mar.	29,713	28,310
Apr.	27,641	25,808
May	23,708	23,437
June	23,141	18,842
July	18,513	.....
Aug.	27,013	.....
Sept.	26,349	.....
Oct.	25,228	.....
Nov.	25,102	.....
Dec.	21,448	.....
Total for year	298,406	106,803

Source: Defense Council of the Ingot Brass and Bronze Industry

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1954	520,501	322,845	.....
1955			
May	63,735	38,124	74,472
5 mo ..	324,312	199,014	.....
June	66,569	42,753	71,344
July	47,928	27,429	68,927
Aug.	62,677	61,957	75,592
Sept.	62,030	43,498	80,660
Oct.	71,689	46,581	85,489
Nov.	75 099	47,572	93,001
Dec.	70 950	47,547	86,120
Total ..	781,254	516,351	.....
1956			
Jan.	68,050	43,750	83,234
Feb.	66,854	42,300	76,283
Mar.	65,760	42,806	73,025
Apr.	58,274	37,518	71,730
May	52,205	33,920	60,634
5 mo. ..	311,143	200,294	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1955	1956
Jan.	81.0	195.6
Feb.	90.4	169 0
Mar.	163.6	152.7
Apr.	178.6	135.2
May	145.7	207.0
June	186.8	....
July	213.4	....
Aug.	134.0	....
Sept.	156.7	....
Oct.	108.6	....
Nov.	154.4	....
Dec.	183.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1954	54,780,758	8,542,581	855,207	6,100,444
1955				
Apr.	6,239,036	975,751	108,965	726,138
4 mo. ...	23,319,257	3,606,164	404,701	2,645,659
May	6,415,947	963,082	109,074	745,060
June	6,117,573	928,908	116,419	733,573
July	5,447,130	730,735	81,216	623,623
Aug.	5,913,031	868,644	101,607	765,343
Sept.	6,060 491	881,158	119,550	753,318
Oct.	6,443,319	944,685	113,411	820,642
Nov.	6,441,351	952,906	112,056	839,971
Dec.	6,496,796	910,675	115,436	830,404
Total ...	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Jan.	6,688,977	909,201	114,378	880,980
Feb.	6,315,421	892,373	116,418	833,661
Mar.	6,733.076	923.912	101,087	863 950
Apr.	6,490,680	862,233	96,514	842,216
4 mo. ...	26,258,154	3.587,719	428,397	3,420,807

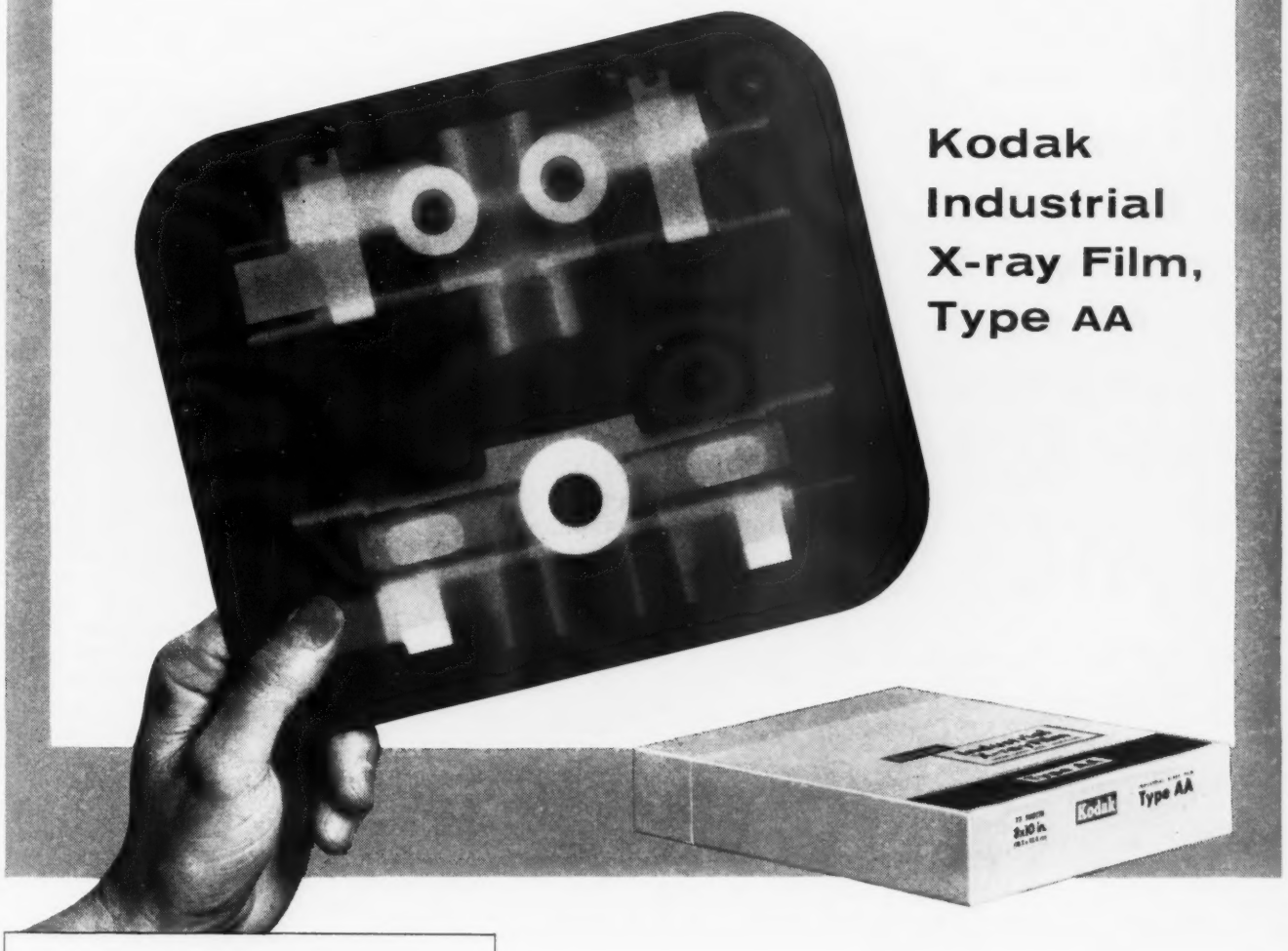
PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1954	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4.364,418	215,158	155,258
1955									
May ...	6.753.236	246.661	342.544	5.385,299	788,732	6.044,882	471,657	21.448	20,085
5 mo..	30.614,054	1,131.643	1,532,456	24,821.876	3,138,079	26,768,642	2,238,427	106.500	91,490
June ...	6,494,838	238.412	347,631	5,245,861	662,934	5.774,896	454,751	22,871	21,697
July ...	6,329.393	233,235	344,365	5,116.960	634.833	5.430,550	361,171	16.483	19,535
Aug. ...	6,529,580	251.459	319,951	5.214,901	743,269	5.769,689	442,532	22,014	25,685
Sept. ...	6.653,578	252,630	343,919	5.397,134	659,895	5,903,190	445,099	23,340	24,552
Oct. ...	6.905,280	267,405	315,015	5,647,527	675,303	6,193.512	470,610	22,659	23,328
Nov. ...	6.636,649	241,727	353,713	5,404,584	636,625	5.973,223	469,485	22,621	18,148
Dec. ...	6,887.667	242,446	329,607	5,660,307	655,307	6,131,680	444,459	23,520	21,971
Total .	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Jan. ...	6,985,945	210,755	317,216	5,806,140	651,774	6,275,224	441,634	24,062	11,766
Feb. ...	6,539,199	229,440	370,208	5,350,650	588,901	5,871,824	430,792	24,307	13,010
Mar. ...	7,083,877	196,533	352,856	5,843,852	690,636	6,316,836	427,177	23,737	18,725
Apr. ...	6,860,833	210,319	333,660	5,623,647	693,207	.....	.....	.....	.....
May ...	6,873,102	232,375	329,750	5,625,067	685,910	.....	.....	.....	.....
5 mo..	34,342,956	1,079,422	1,703,750	28,249,356	3,310,428	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

New X-ray Film

gives greater detail with usual exposure times



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Circle 699 on Inquiry Card—Page 245

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"In the Mail"

IF A DIFFERENCE of opinion makes a horserace, it is equally effective as a stimulant in foundry practice. In the May issue of this publication, I became overenthusiastic in my little sermon on moisture-control and stated that " . . . most naturally bonded sand was worthless when worked with less than 6 per cent moisture."

If in so writing I expected to be contradicted, I have not been disappointed.

E. C. Sawyer, Ayers Mineral Co., Zanesville, O., has taken his stenographer in hand to show me the error of my assumption and to reprove me gently for making a statement that covered too much sand. Although Mr. Sawyer agreed with me that old-time practice with naturally bonded sand leaned toward an excess of water, he pointed out that today many such sands are sold on a prescription basis, with screen distribution and clay content to suit the purchases. In many instances, these sands are blended with synthetic mixes to improve casting finish and to cushion the more expansive silica grains.

The Old vs the New—My comments were for the most part inspired by the local experience of myself and others and by the literature covering a large segment of our national sand practice. In the transition from naturally bonded to synthetic practice, we perhaps were overenthusiastic in our praise of the new and our denunciation of the old. We had plenty of trouble with the old sand, as coated by nature, and despite all our modern methods of control with the so-called synthetic material, we still have trouble. It might be advisable to reappraise our gains and losses in the changeover.

Synthetic or "formulated" sand now has held the spotlight for over 20 years. Its virtues have been publicized the world over, and its problems perhaps have been minimized. Those who clung to naturally-bonded sand seemed to feel that they either

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Circle 700 on Inquiry Card—Page 245

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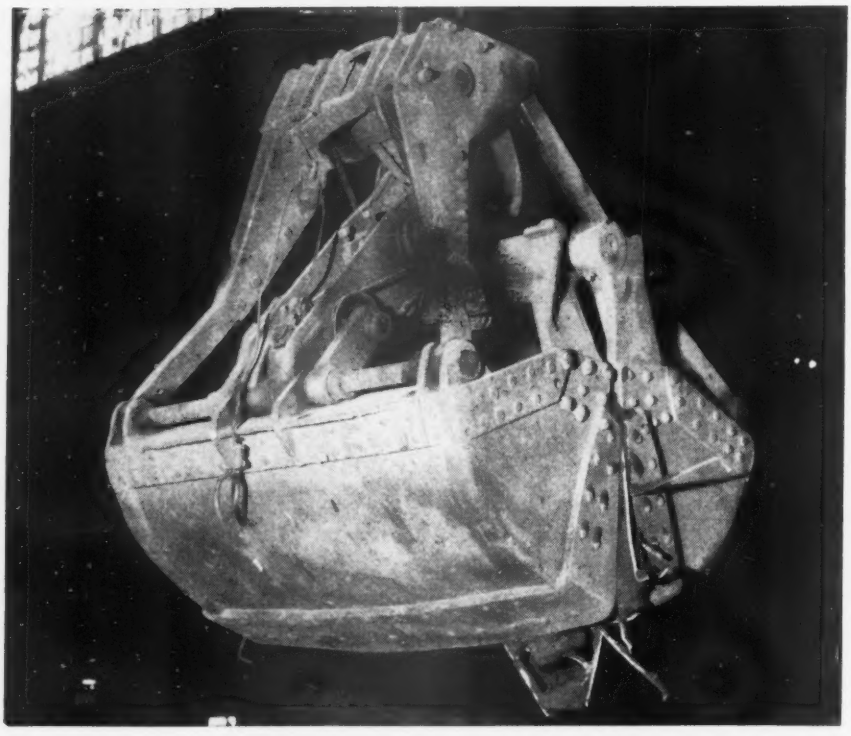

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Circle 701 on Inquiry Card—Page 245

must apologize for being out of step or remain grimly silent. Most of them adopted the latter course. During those 20 years, I have read but one article in praise of naturally bonded sand, and even that covered the subject almost apologetically.

Those of us who pride ourselves on being of the new school were willing to concede that "Millville Gravel," although of natural bond, probably was one of America's best molding sands. But only foundrymen in the vicinity of New Jersey could afford this luxury, and there was some question as to how long even that precious deposit would last. Albany sands enjoyed top-rating for years and were purchased in quantity even here on the West Coast. Today, however, we seldom hear them mentioned.

Speaking of Misnomers—The word "synthetic" as applied to foundry sand practice may be a misnomer, but it hardly is more misleading than "nonferrous." The word reminds me, incidentally, that most aluminum and brass foundries still insist on naturally bonded sand.

Mr. Sawyer enclosed in his letter a booklet entitled "Standard Analyses of Tennessee and Ohio Molding Sands," which was published by his company. It covers more than 50 different grades of screened, blended and aerated naturally bonded molding sands, with about every screen distribution imaginable, with clay contents from 8 to 25 per cent and with AFS numbers from 36 to 128. This little booklet proved something of an eye-opener to your inquisitive correspondent.

I did note, however, that the pan material ran from 1 to 5 per cent. For many years here on the West Coast, our nonferrous and light-iron shops relied on "San Diego" naturally bonded sand, which carried over 50 per cent pan material.

If, as Mr. Sawyer hints, I have implied that "Naturally bonded molding sand isn't good enough to raise weeds in," I hereby apologize most humbly —and plead ignorance, gentlemen, unmitigated ignorance. For my own enlightenment, as well as that of others, I suggest that Mr. Sawyer and others familiar with the subject bring us complete coverage on the current status of naturally bonded sands.

Australian Response—I recently received an airmail letter from Australia. It was postmarked May 28 and was delivered to me on the 31st—hardly more than three days enroute. It took me three weeks to make that trip in 1917, by the fastest ship.

My correspondent from Down Under, Stanley G. Morris, was interested in my "Australian Memories" and took time out to bring me up-to-date

on the foundry situation there. It seems that most of the shops I knew are still doing business at the same old stands, but have been mechanized to a considerable extent and are following closely the American pattern.

Shell molding, sandslingers and overhead conveyance of sand all are part of the picture now, and some attempt at sand control has been made. Mr. Morris states, however, that the Australian foundryman still is limited to a very narrow selection of sand and has little choice as to grade or fineness. He makes no mention of the bonding clays available or of other additives which might be considered essential to good sand practice.

It is to be hoped that Australian foundrymen will organize an active sand committee and thus enjoy the benefits which inevitably will result. In a land famous for its zircon sands, there surely must be other valuable molding materials available. No country is more bountifully blessed with white beaches and expansive stretches of desert, and these must surely carry values for the Australian foundryman.

There also are sizable deposits of short-grained asbestos in New South Wales which might prove an invaluable source of "cushioning additive." About eight years ago, J. W. Horner Jr., of Denver, reported success in his experiments with the addition of asbestos to molding sand for the purpose of retarding the chilling effect of green sand.

Book Review

Metallurgical Thermochemistry, by O. Kubaschewski and E. Evans, 410 pages, published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16. Price $10.

First edition of this work was available only through the English publisher, but this revised second edition is now obtainable through John Wiley & Sons. Divided into five parts, the first section discusses the theoretical basis, and consists largely of formulas necessary for applying fundamental data to reaction problems. Next, the authors describe the main experimental techniques used to determine thermochemical data, and their relative advantages and disadvantages.

A third section describes methods of estimating values that cannot ordinarily be determined. Via tabular form, in Part 4, values of thermochemical constants for a large number of elements and compounds of possible metallurgical importance are supplied. Final section of the book contains examples of practical applications of thermochemical methods.

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Circle 702 on Inquiry Card—Page 245

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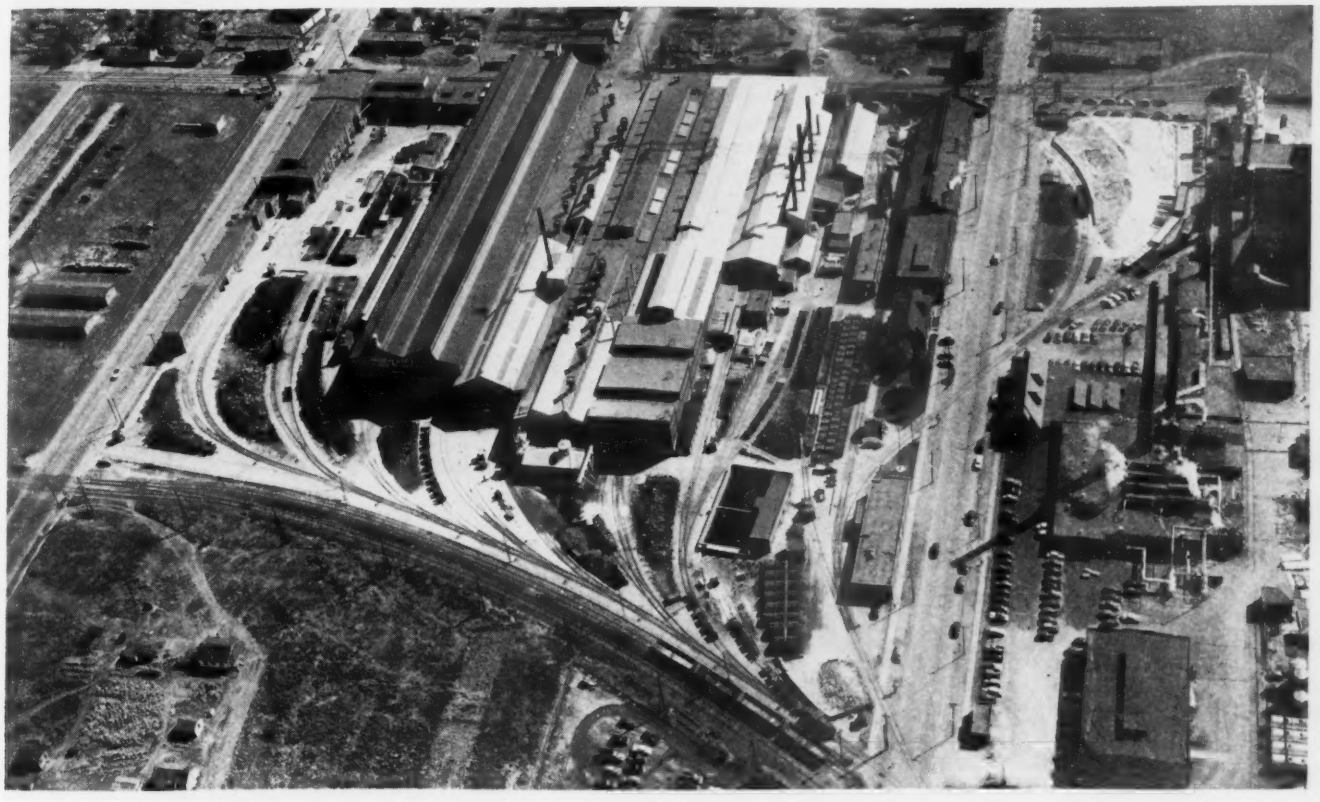

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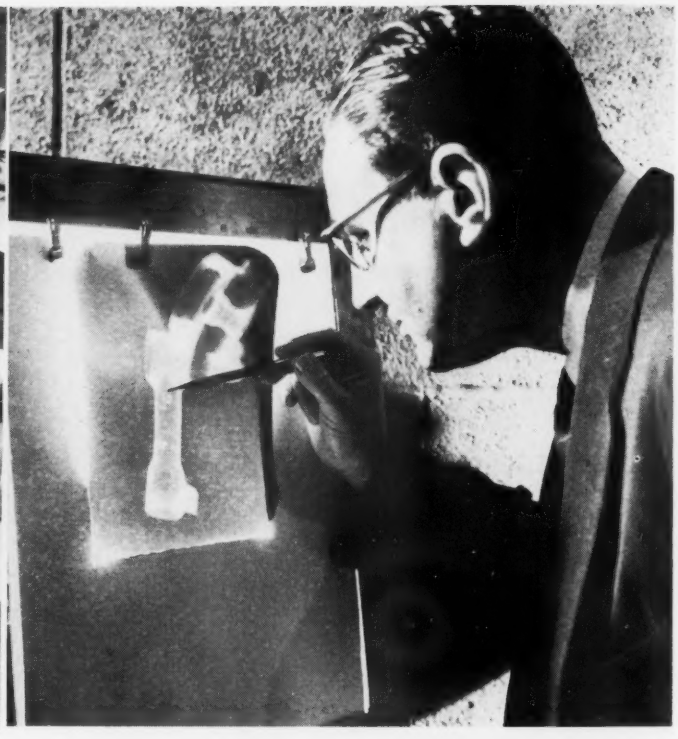
Circle 703 on Inquiry Card—Page 245

Portable gamma ray projector is positioned to radiograph an aluminum casting for a gasoline hose nozzle

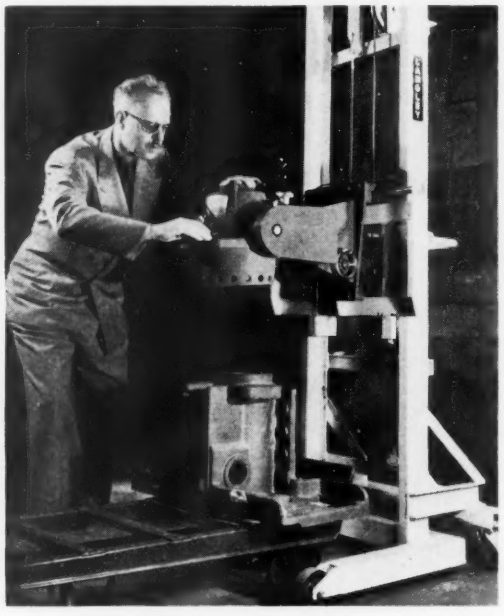


All sections of nozzle are clear on the radiograph. Defects as small as 2% of thickness are seen easily

Portable Projector Simplifies

RADIOGRAPHIC INSPECTION

By CHARLES M. DICK
Metal & Thermit Corp.
New York



Projector is positioned to radiograph railroad car coupler casting

DEMAND for radiographic inspection of castings has been increasing in general industrial practice as well as in specifications of the Armed Forces. This demand has posed a problem to some foundries because of the large investment ordinarily required for radiographic facilities.

One solution may lie in a new system of industrial radiography which is based on the projection of gamma rays from portable atomic projectors.

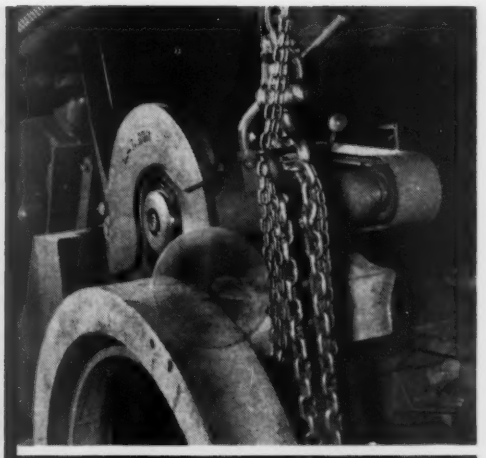
Initial cost is relatively so low that the gamma ray projectors seem destined to expand greatly the practical application of radiography in the foundry.

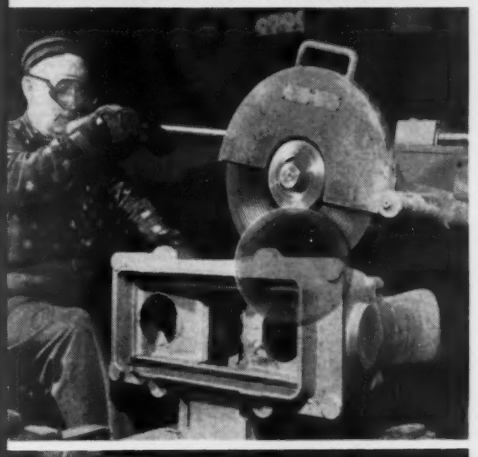
Pioneer Work—Much pioneer work with this new means of nondestructive testing was carried out at M. W. Kellogg Co. The company has been active in this field for many years, using x-ray equipment and radium. When radioisotopes first were made available for commercial use by the Atomic Energy Commission, Kellogg applied to the AEC for permission to use them.

The firm's engineers designed projection instruments originally intended only for their own use. Now, however, Kellogg has undertaken commercial production and has appointed Metal & Thermit Corp. to distribute its projectors for use in nondestructive testing.

Gamma ray projectors are compact, easily transported and positioned and need no external power source. As in other radiography, they produce shadow pictures on film placed behind the casting. The ease with which they may be used en-

For all-around usefulness ...you can't beat the BN





Norton Reinforced Resinoid Wheel brings strength, safety and "TOUCH OF GOLD" economy to many jobs

Fast, cool grinding action, great safety, long life and a wide job range are advantages that make the Norton BN reinforced resinoid wheel one of the most popular and useful foundry production tools.

High resistance to breakage is assured by its tough resinoid bond and glass cloth-reinforced structure. Primarily a cut-off wheel, its rough, knurled sides provide additional cutting action. As a result, it's unequalled for cutting-off gates and risers on non-ferrous castings, as well as for light snagging, slotting, cleaning and deburring of both ferrous and non-ferrous castings.

You can use it on your portables, bench stands, swing frames, floor stand grinders and on any type of heavy or light duty cut-off machine — and you'll profit by its money-saving "Touch of Gold" every time it goes into action.

The Rubber Bonded **RN**... Another Norton Standout

For your cutting-off jobs where a rubber bonded wheel is preferable, the Norton RN is ideal, especially on ferrous metals. Strongly reinforced, fast cutting and long-lasting, it's an excellent value at nominal cost.

See Your Norton Distributor

about a demonstration of Norton reinforced wheels in your plant. And ask him for the big reinforced wheel catalog with net prices. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

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Saves money *three* ways: eliminates costly down time by *automatically* maintaining any predetermined high or low sand level; lowest initial cost; no installation fee—install it yourself.

Built to highest standards of accuracy and efficiency, the Hartley Sand Control may be used also to operate supply equipment, a plow, or produce a signal. Enclosed in J. I. C. case.

HARTLEY Controls CORPORATION

SPECIALISTS IN FOUNDRY CONTROLS

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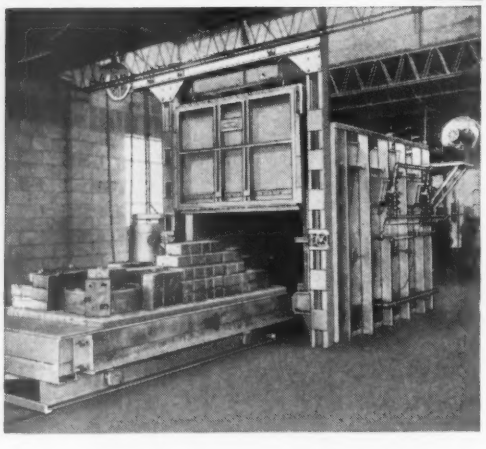
Circle 705 on Inquiry Card—Page 245

For Normalizing, Annealing and Stress Relieving

JOHNSTON CAR BOTTOM FURNACES



Engineering experience is apparent in the smooth operation of the Johnston Car Bottom Furnace. Roller bearings in car and door hoist shafts, mechanical car seals, and power operated car pullers are just a few of many practical features. Johnston "Reverse Blast" low pressure burners for oil or gas assure clean, economical, efficient heat for annealing, normalizing, and stress relieving.

Write for Bulletin F-240

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● Melting Furnaces ● Heating Torches ● Ladle Heaters
● Heat Treating Furnaces ● Burners, Blowers, Controllers
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ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

Circle 706 on Inquiry Card—Page 245

ables the foundry to make radiographs quickly and easily.

End Wasted Machining—Castings on which a considerable amount of machining is to be done may be radiographed on a routine basis before machining. Flaws can be detected before the costly machining operations are performed.

Castings which will be subjected to vibration or shock loads in use may be inspected quickly by radiography to determine their fitness for use in critical applications. Heavy sections may be tested as readily as thinner structures. Exposure times are somewhat longer on thick sections, but the high energy level sources of gamma rays penetrate thick sections in a relatively short time.

Patterns of Radiation—The pattern of radiation may be varied to project the rays in a cone shape, a hemispheric dome or a 360-degree doughnut ring panorama. Use of the panoramic exposure pattern saves much time where a large number of castings are to be radiographed.

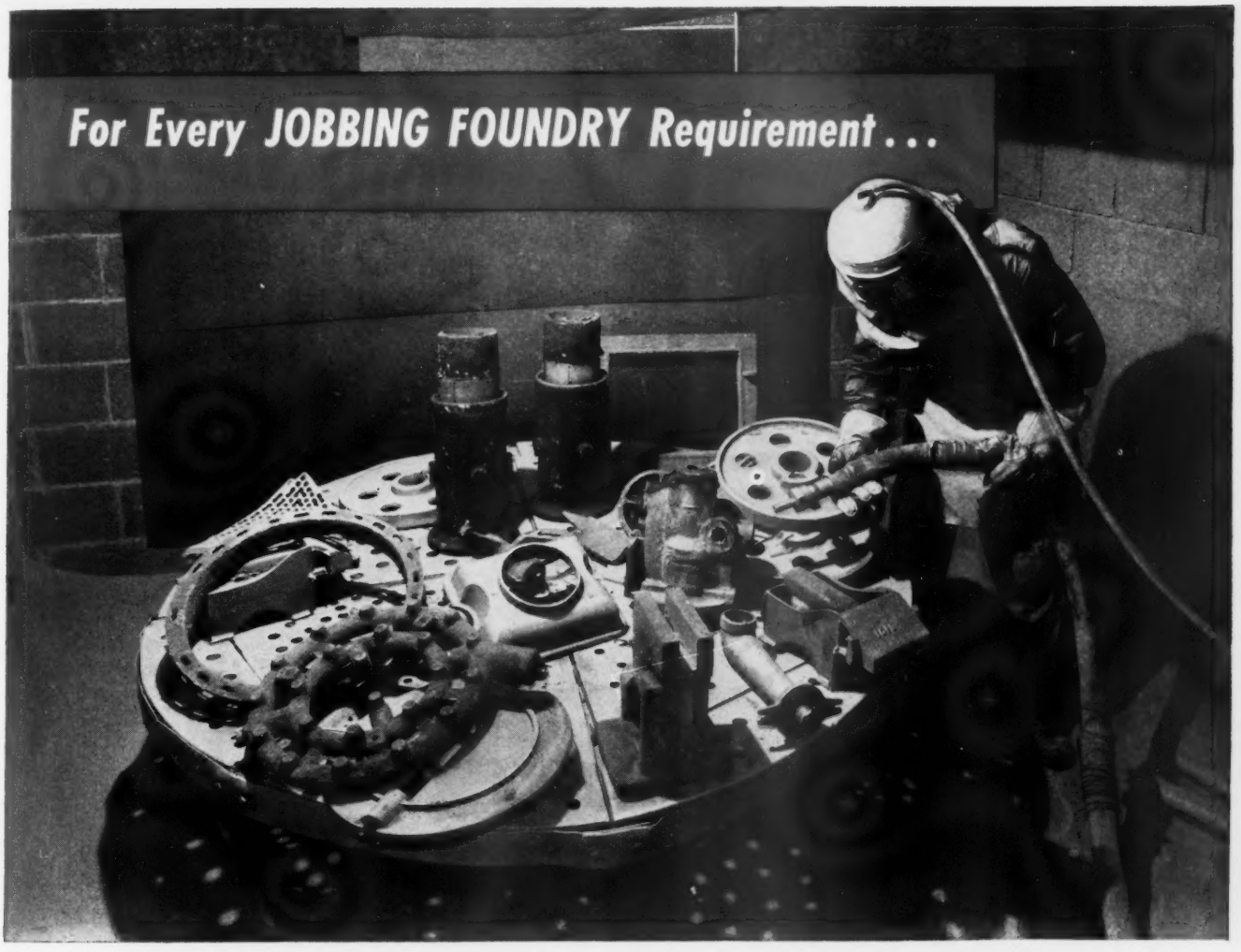
In this procedure, the castings are set up in a circular arrangement and the projector is positioned at the center of the circle. For example, as many as 25 castings may be arranged in a 6-ft-diam circle, with an 8 x 10 film behind each piece. A single opening and closing of the shutter then radiographs all these pieces in one exposure.

Theoretically, all that is needed to produce radiographs by gamma rays is a pellet of radioactive material on one side of the object and a sheet of photographic film on the other. But such an arrangement is hazardous in industrial radiography. Mounting the isotope in a projection device is the step that makes the system convenient and safe.

Function of the Projector—The principal function of the projector is *shielding*. Unlike x-rays, the gamma rays emitted by radioisotopes cannot be turned off at the source when the exposure is complete. The source must be surrounded by shielding which effectively blocks radiation when the projector is not in use. The projectors are shielded with lead and other dense materials, the thickness of the walls depending on the strength of the isotope employed.

Directional Control—A second reason for using the unit is to obtain directional control of the radiation. A radioactive source emits radiation in all directions. In practice, either a narrow cone or a circular band is desirable. The projector provides a simple device to adjust its shielding to produce the radiation pattern desired.

Safety—A further, vital, reason is



NEVILLE PIG IRON

If you're a jobbing foundry man, we don't have to tell you about the great variety of gray iron castings you produce in your shop. All you have to do is leaf through your production schedules for the past six months for a reminder of the great diversity of sizes, patterns and analyses which you cast to specification.

The point is this: Because we not only produce but *stock* Neville Pig Iron in a wide variety of analyses, we feel we can help simplify your pig iron supply problem considerably. We can ship Neville Pig Iron in virtually any analysis and quantity you may need . . . and on schedule!

We'd like to talk over your specific pig iron requirements . . . and offer you our technical assistance without obligation. *Write or call today.*

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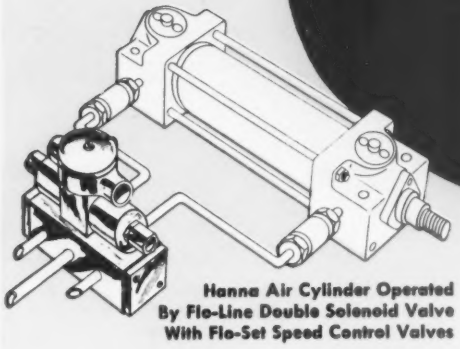
4-WAY VALVES
FOR AIR OPERATION
UP TO 150 PSI
SIZES: 1/4", 3/8", 1/2"



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By Flo-Line Double Solenoid Valve
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Flo-Line Double Solenoid Valve

Hanna has designed and built new and unusual features in their Flo-Line Solenoid Valves . . . features that result in economy, more versatile operation and safety. Here are some of them:

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- **Wide Range of Temperatures and Pressures** —40° F. to 125° F.; 20 to 150 psi air. Options permit air pressure to 250 psi and even vacuum!
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- **Junction Box** for ease in making electrical connections.
- **Modern Clean Cut Appearance**

You'll surely want the complete details given in the new Hanna Flo-Line Catalog No. 261. See your classified telephone directory or Thomas' Register for the name of your nearest Hanna Representative—or write us direct.

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT • CYLINDERS AND VALVES

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safety. Although unshielded radioisotopes can be handled in a "hot" laboratory—with highly trained personnel, remote handling equipment and elaborate monitoring techniques—this procedure obviously is impractical for shop or field use. The projector provides the means for shielding the source at all times, whether in transit or in storage. A lock on the instrument prevents tampering or unauthorized use.

The projectors are made in three sizes. Selection of the proper size for a given application depends on dimensions, wall thicknesses and geometry of the castings to be radiographed and the degree of portability desired. They may be positioned in simple fixtures, supported by hoists, or mounted on dollies or lift trucks.

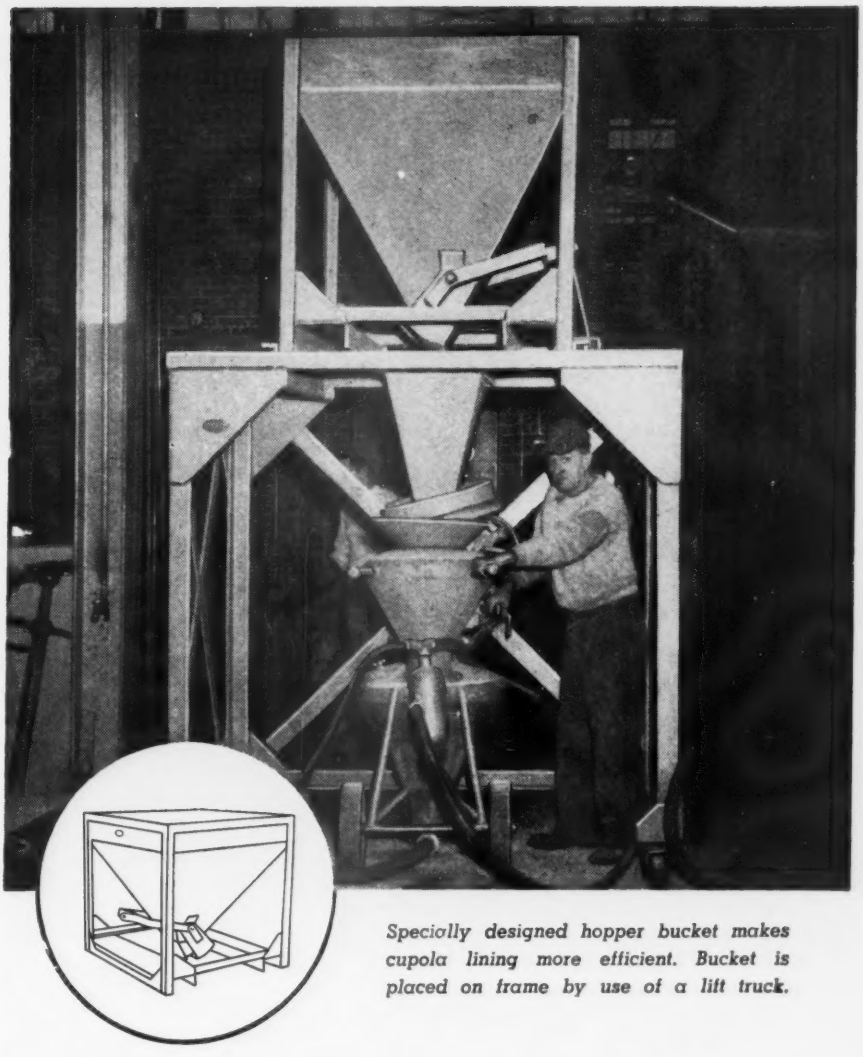
Three Sources Available—Three energy sources of different intensity are available: Cobalt 60, cesium 137 and iridium 192. Industrial life of these isotopes is 7.2 years, 27 years and 72 days, respectively. They may be used for longer periods by successively increasing the exposure time.

Selection of the radioactive source depends on the size of the projector to be used, the penetrating power needed for the thickest sections to be radiographed and the definition and clarity of image required. Intensity of energy source is balanced against service requirements to provide units efficient for their purposes, yet reasonable in size, weight and cost.

Small Unit—The smallest size weighs but 75 lb and offers maximum portability. With 5000 millicuries of iridium 192, this unit is suitable for radiographing sections up to 2 in. thick. It is carried about easily by one man and is set up quickly for cone pattern shots in difficult places where space is restricted.

Intermediate Unit—The intermediate size of gamma ray projector is more versatile as well as more powerful than the smallest size. It can be adjusted to project rays in all three patterns of radiation—cone, hemisphere or ring. It is designed to contain 100 000 millicuries of iridium 192 or 5000 millicuries of cesium 137. This model is equivalent to 250-kvp and 440-kvp x-ray machines. It weighs about 250 lb, is easily positioned and can be manipulated without the use of elaborate rigging.

Large Unit—The largest size is intended for the radiography of heavier castings. For maximum penetration, it is designed for use with a 50,000 millicurie source of cobalt 60. With this source it radiographs steel as much as 8 in. thick. This model



Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.

Solve Your Material Handling Problems With PENN IRON SPECIAL EQUIPMENT

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

Whatever the bulk-material handling problem in your plant, Penn Iron Works, Inc., will be glad to help with its solution. Our wide experience in designing and manufacturing all types of buckets and special handling equipment for foundries can help you cut costs . . . save time . . . increase efficiency.

For Further Information Write:

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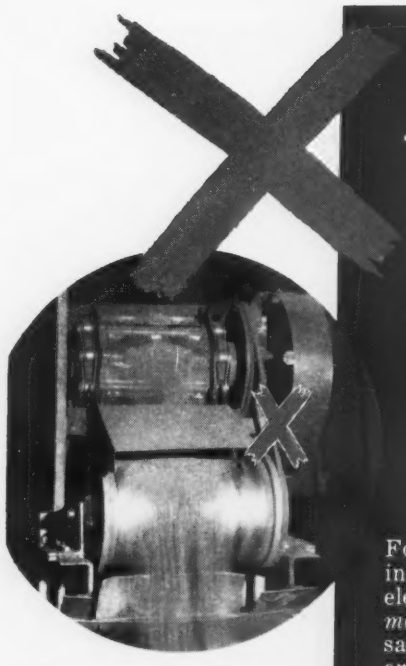


...MARKS THE SPOT IN YOUR SAND HANDLING SYSTEM WHERE A

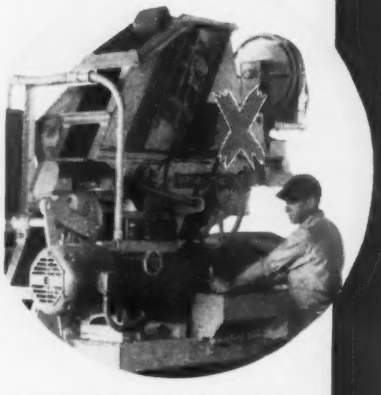
DINGS PERMA-DRUM SAVES MONEY

For many applications, there is nothing to compare with a Dings non-electric Perma-Drum for *fully automatic*, low cost removal of iron from sand. Use them below apron conveyors where magnetic pulleys may not be practical. Install them below chutes or spouts where no other type of magnetic separator will fill the bill. Apply them for final removal of shot iron and small fragments that may get by the first separation of shake-out sand.

WITH APRON CONVEYORS, or in any installation where pulley-type separators are less practical, a Dings Perma-Drum is the simplest solution to magnetic separation problems.

Check these Perma-Drum features

- **Completely automatic operation — separates and discharges the iron.**
- **Life-time magnetic power — permanence guaranteed.**
- **Non-electric, Alnico design — no electro-magnet maintenance.**
- **Maximum magnetic power — the most powerful drum-type separator available.**
- **Magnetics are cleanly discharged from the drum shell, minimizing wear and providing years of maintenance-free operation.**



IN SAND PREPARATION EQUIPMENT, Dings Perma-Drums give positive protection against tramp iron damage while assuring the *complete* magnetic separation necessary for *complete* sand preparation.

The Dings Magnetic Perma-Drum is one of a complete line of magnetic separation units engineered by Dings to meet every foundry requirement. Write for information about Dings electric and non-electric magnetic pulleys; rectangular suspended magnets (standard or self-cleaning); lifting magnets; non electric Perma-Plate magnets.

UNDER CHUTES, SPOUTS or bins, a Dings Perma-Drum is the most efficient, low cost method of magnetic separation.

Dings

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DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave.
Milwaukee 46, Wis.

PD156-2/3

Circle 710 on Inquiry Card—Page 245

also is designed for mounting on a mobile rig, if desired. Specially designed lifting lugs make it easy to focus on the subject from many different angles.

On the job, the projectors require no more special handling than other foundry equipment. They withstand rough handling and are waterproof, fireproof and tamperproof.

Exposure times with gamma rays are relatively short, assuming that projector and isotope have been properly selected for the requirements of the application. Time depends on six factors: Film speed, type of source, source strength, distance of piece from source and thickness of the type of material being radiographed. Exposures needed for various conditions may be calculated easily.

Offers Sixth Volume of Brief Safety Talks for Foremen

A sixth volume of "Five-Minute Safety Talks for Foremen" has been published by the National Safety Council. Like previous volumes, it contains 52 talks designed to build sound attitudes on accident prevention. The five-minute talks provide ready-to-use outlines and texts for either informal safety pep talks or scheduled training sessions.

The volume includes material on general topics such as attitudes, lifting and first aid and information on such specific problems as the use of powder-actuated hand tools, masonry chipping, caustic chemicals, explosive dusts, inflammable liquids, drills, saws and electricity. Two talks on off-the-job safety also are included. Writer of the talks is Roland Blake, co-author of *Industrial Safety* and well known authority on industrial accident prevention.

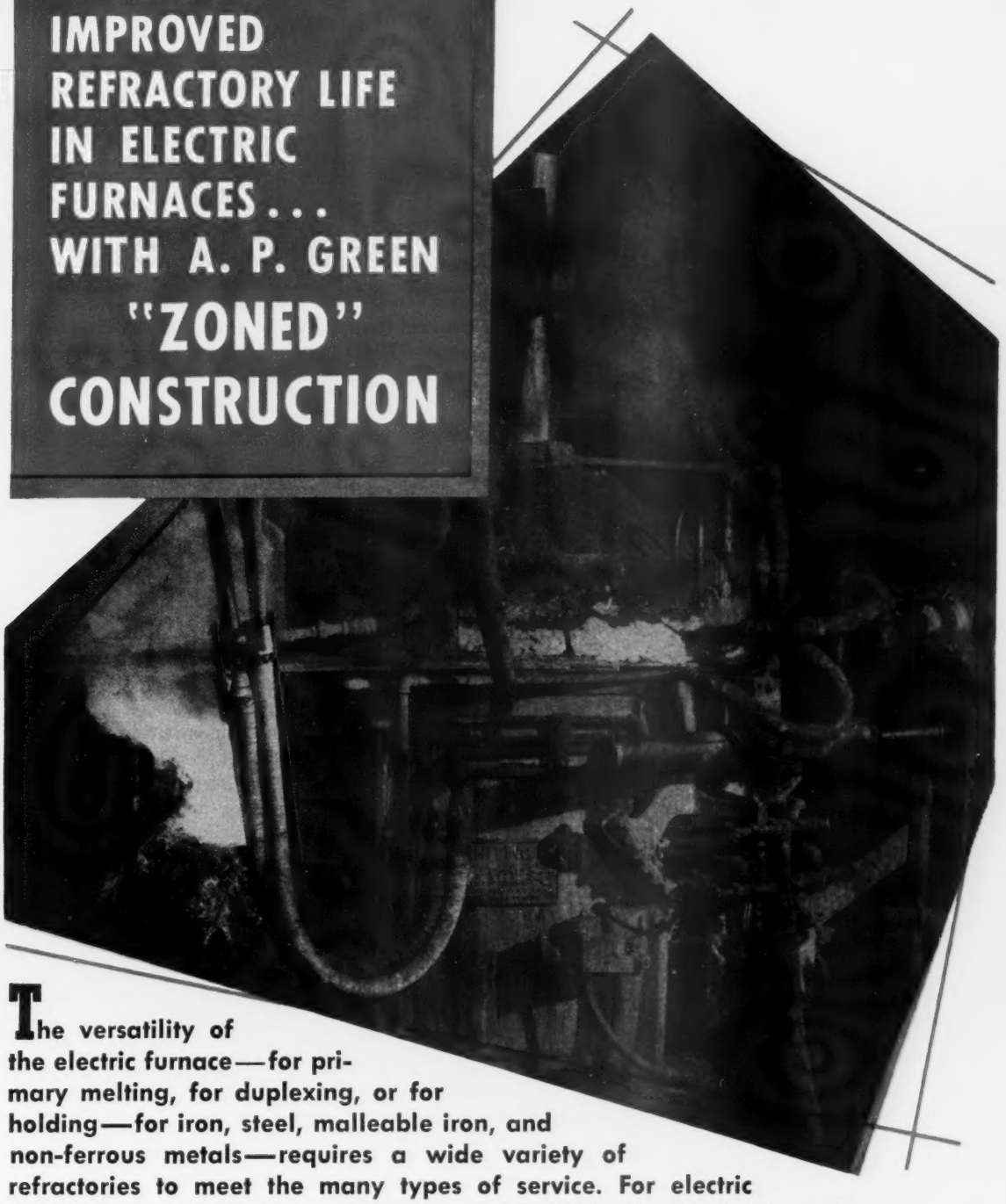
For further information and prices, write to the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

Book Explains How To Manage

Lawrence A. Appley, president, American Management Association, New York, is the author of *Management in Action,* a new book which emphasizes how to manage. Each section of the book, on a different important aspect of executive action, provides practical suggestions to readers. Contents cover authority, management responsibility, employee morale, executive appraisal and related matters.

The 382-page volume was published by the AMA, 1515 Broadway, Times Square, New York 36. Copies are $5 to nonmembers, $3.50 to members.

IMPROVED REFRACTORY LIFE IN ELECTRIC FURNACES . . . WITH A. P. GREEN "ZONED" CONSTRUCTION



The versatility of the electric furnace—for primary melting, for duplexing, or for holding—for iron, steel, malleable iron, and non-ferrous metals—requires a wide variety of refractories to meet the many types of service. For electric furnace roofs, A. P. Green super duty brick, high alumina brick, and monolithic refractories have performed outstandingly in many applications. Even in a specific installation, the service life of a roof may often be materially increased by the judicious combination of several types of refractories. Such "zoned" construction offers maximum economy.

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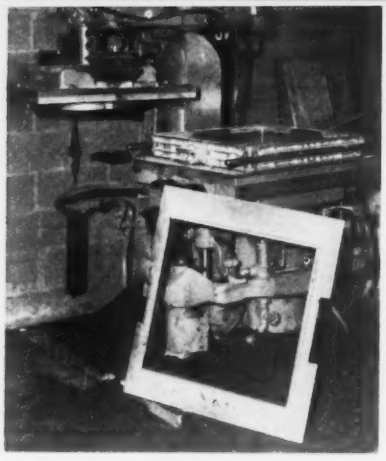
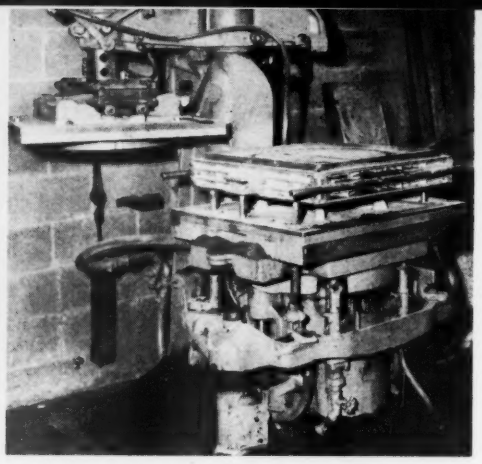




Illustrations show molding sequence with flasks of the hinge-off type. Fig. 1 (left)—View of flask and sand shed. Drag pattern is swung to one side. Fig. 2 (center)—The band is in place and flask and band are filled with sand before mold is squeezed. Fig. 3 (right)—The mold has been squeezed and pin lifted. Drag pattern is in head, cope pattern on the jar table

Production Increased by New Stack Molding Technique

By KENNETH L. MOUNTAIN
Associate Editor

ON A PILOT operation under production conditions, a simplified stack molding technique developed by Hines Flask Co., Cleveland, has almost doubled mold production while reducing sand requirements about 40 per cent and casting costs about 20 per cent.

Two men working as a team can turn out 26 completed molds per hour (including shoveling sand by hand), compared with 16 to 17 per hour when following conventional practices.

Flasks of the hinge-off type shown in the accompanying illustrations are 23 in. square x 3½ in. deep. Other sizes can be supplied. Equipment can be adapted to any commercial molding machines. Slight modifications to present patterns are required before they can be adapted to this technique.

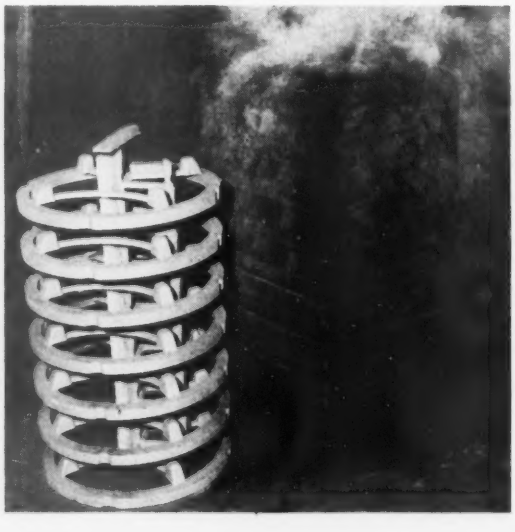
In practice, the procedure starts when a cope board is placed over the cope pattern mounted on the piston table of the molding machine. This cope board permits this mold section to provide a flat surface on the bottom of the first mold so it will rest flat on either the foundry floor or a bottom board.

A flask section is placed on the pins over the cope board, which is resting on the cope pattern. A sand shed, shown resting against the machine in Fig. 1, is placed on the drag joint or the top of the flask which is in position. The sand shed provides a depression for the band which acts as the seal between sections of the stacked mold. It also provides for a thin section of sand between the band and the flask. The flask is filled with sand above the top of the sand shed. Excess sand is struck off. The sand shed is removed and a band is placed in the drag or on the top part of the flask, as shown in Fig. 2.

The mold is squeezed, drag pattern stripped and mold is pin lifted from the cope pattern. The mold is placed on the floor or on a conveyor. Closing pins are inserted in the flask section so it can be closed accurately with the next section. The cope board is removed from the machine.

The next six identical sections are made in this manner. A flask section is placed over the pins on the cope pattern. The sand shed is placed on the flask and spring sprue cutters are positioned. Flask and shed are filled with sand and excess is struck off before the sand shed is removed. A band is set in place prior to squeezing the mold, strip-

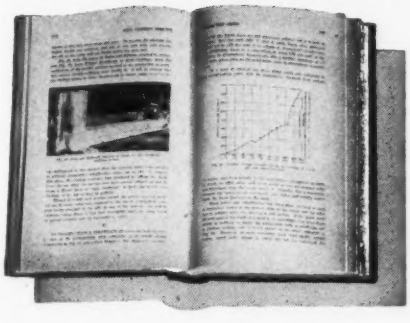
Fig. 4 (below, left)—Stack being assembled. Pins are pushed through to maintain alignment. Bottom flask is ready for removal. Pins are moved from flask to flask. Fig. 5 (below, right)—Castings are removed from a stack. The other stack, shown in the background, has just been poured



NEW — Just Published!

STEEL FOUNDRY PRACTICE

By JOHN HOWE HALL



496 pages
252 charts and illustrations
6" x 9" cloth bound
Price $12.00

Just published—*Steel Foundry Practice*—a new comprehensive sourcebook covering all phases of modern steel foundry practice. This book is the only up-to-date treatment of the subject available today.

Steel Foundry Practice contains practical information on almost every production problem steel foundrymen encounter. The easy-to-read text is accompanied by over 250 detailed charts, drawings and illustrations of the "how-to-do-it" type.

This volume represents the last of the many contributions which the late John Howe Hall made to the progress of the foundry industry. Material presented in this book began as a series of articles in FOUNDRY magazine.

Steel foundry personnel (from top executives to apprentices), educational institutions, technical libraries, suppliers to the steel foundry industry . . . all will benefit from the use of this book.

A complete cross index permits ready reference to any section. Many references relating to additional sources of information are provided. Use the coupon at the bottom of this page to order your copies now.

ABOUT THE AUTHOR

The late John Howe Hall was associated with the production of steel castings for nearly 50 years. Mr. Hall received his bachelor's and master's degrees from Harvard University. He was employed by Bethlehem Steel Co. and Buffalo Crucible Castings Co. until 1906, when he joined Taylor-Wharton Iron & Steel Co. He remained there until 1937, when he became a consulting metallurgist. His previous major work was The Steel Foundry, *published in 1914, with a second edition in 1922.*

Mr. Hall was the author of many papers presented before the American Society for Testing Materials, the American Foundrymen's Society, the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers. In 1924, he received the first Whiting Medal awarded by the AFS.

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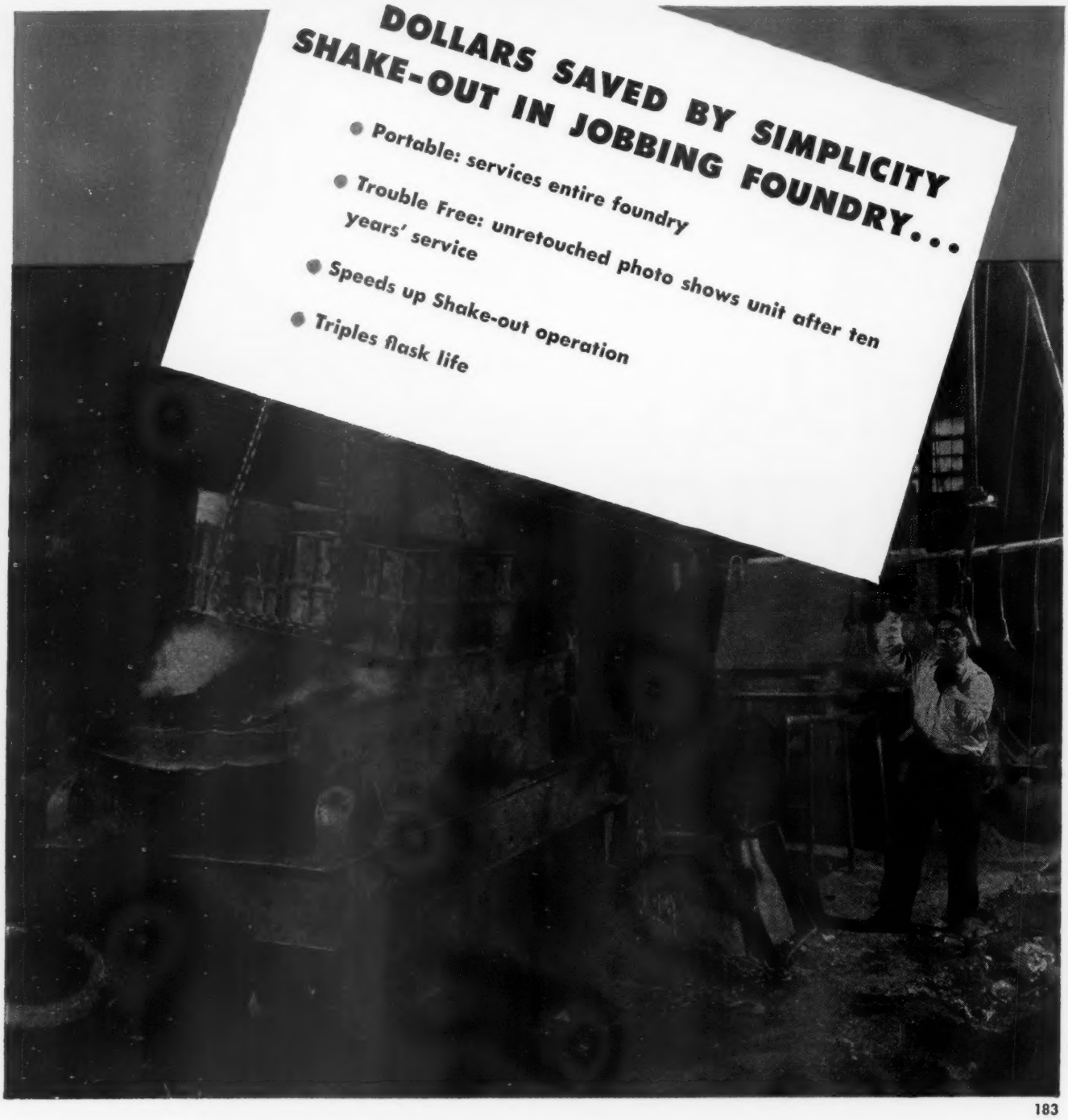
DOLLARS SAVED BY SIMPLICITY SHAKE-OUT IN JOBBING FOUNDRY...
Portable: services entire foundry
Trouble Free: unretouched photo shows unit after ten years' service
Speeds up Shake-out operation
Triples flask life

183

"It is an extremely rugged machine, and except for small replacement of parts, needs little maintenance . . . we are very pleased with its service." This praise for a Simplicity 4' x 8' Portable Gyrating Shake-out comes from the General Manager of Saginaw Foundries Company, Mr. Lenwell Cline. The Simplicity Shake-out has been in operation at this Saginaw, Michigan, job foundry for 10 years, handling all shake-out work for the plant's small casting area. Very hot steel castings, ranging from 5 to 400 pounds, are shaken-out. The Shake-out is moved by crane from one pouring bay to another, and when plugged in is ready to operate. Faster shake-out, cleaner castings and triple flask life over previous manual shake-out are reported by Mr. Cline. Your plant, too, may benefit from installation of Simplicity equipment . . . why not write today for our Foundry Equipment Catalog?

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ENGINEERING COMPANY • DURAND 7, MICHIGAN

ping the drag and pin lifting or stripping the cope. Spring sprue cutters are removed and the mold section is placed on the first section of the mold in the stack. Loose pins are pulled into the section of the mold to maintain alignment in the stack. The flask from the first or lower section is removed. The flask is closed, locked and placed on the molding machine for another cycle.

Same procedure as described above is followed in making the eighth or last section of the multiple stack mold except that when the band has been positioned a drag board is placed on the band to squeeze a flat surface on which mold weights can rest. Mold is placed on top of the stack, pins are pulled through, weights put in place and the series of molds is ready.

Each mold section weighs about 200 lb, of which 150 lb is sand.

OPENS NEW SAND LABORATORY ON WEST COAST

Interest of foundrymen in sand control was evidenced by the attendance of over 200 at the recent opening of the new Brumley-Donaldson Co. sand laboratory. This new facility is said to be the best equipped sand laboratory west of the Mississippi providing a non-commercial service to West Coast foundries.

It is located at 5955 State St. in Huntington Park, Calif., near the main offices of the company, a supplier of foundry raw materials. Although it is small—slightly over 1000 square feet in area—the laboratory contains complete weighing, baking, mixing and core blowing facilities in one room, while another is devoted to the storage of samples and special tests such as gas pressure and screen analyses. The main room houses the testing equipment for green, dry and hot properties of both core and molding sands, as well as equipment for total gas volume and ignition loss determinations.

New processes and materials such as CO_2, high-pressure molding, shell molding and coremaking, and chemically treated sands will be thoroughly tested and evaluated as to their application in the production of specific castings in specific foundries.

This new service typifies the growth of the foundry industry on the West Coast. On the occasion of its 30th anniversary, Brumley-Donaldson can look back to the days when the foundries were but a small, struggling industry and sand testing was literally unknown.

The laboratory staff is headed by Frank S. Brewster, director of research and development. Mr. Brewster, formerly vice president and general manager of the Harry W. Dietert Co., has served on many Sand Division committees of the AFS. He will divide his efforts between the laboratory and field work.

Both sides of Edco Dowmetal Bottom Boards tell a story

Here are the structural and economic reasons why more and more foundrymen are using Edco Bottom Boards.

1. The flask side of an Edco Bottom Board is grooved and vented; permits gas-escape, insures mold stability.
2. The opposite side is braced like a bridge. The entire board is made of light-weight magnesium—gives you strength without weight for safe, easy handling and long board life.

That's the Edco Design Story. Here's the Dollar Story.

1. Edco Boards pay for themselves. One foundry switched to Edco and cut its yearly burning and breakage loss from 70% to 3%! A 5-year comparison check in another foundry showed that under identical conditions wooden boards had a "casualty" record of 7500 boards lost, as against a mere 12 for its Edco Boards. Scrap loss was 20% less.
2. Volume production of the most popular sizes makes your original investment your *only* investment. Edco Boards cost less than you'd expect.

Write for your free copy of the New Facts File. There's no obligation.

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EDCO ALUMINUM CORE PLATES

Please send Facts File including list of 83 standard sizes available from stock.

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Company_____

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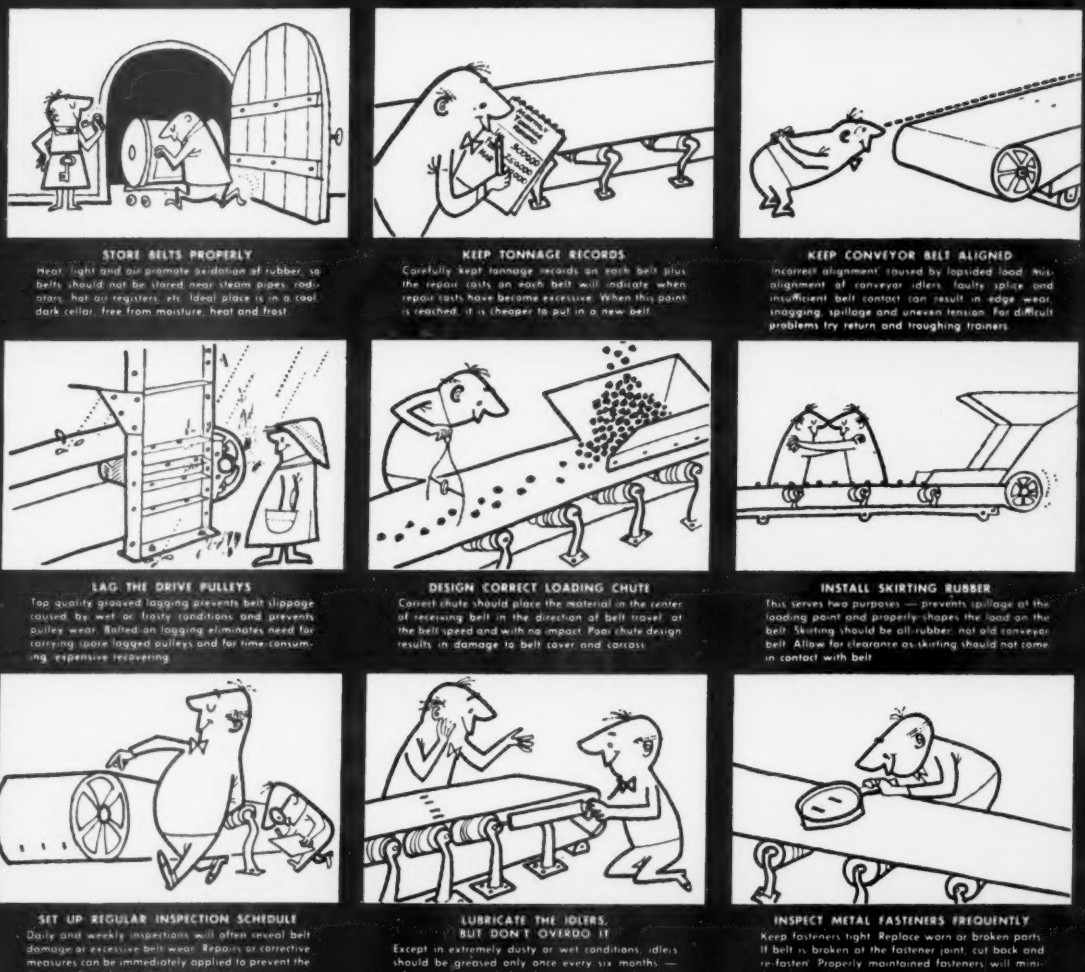
Circle 714 on Inquiry Card—Page 245

MORE CARRY IN YOUR

Free Wall Chart gives



STORE BELTS PROPERLY
Heat, light and air promote oxidation of rubber, so belts should not be stored near steam pipes, radiators, hot air registers, etc. Ideal place is in a cool dark cellar, free from moisture, heat and frost.

KEEP TONNAGE RECORDS
Carefully kept tonnage records on each belt plus the repair costs on each belt will indicate when repair costs have become excessive. When this point is reached, it is cheaper to put in a new belt.

KEEP CONVEYOR BELT ALIGNED
Incorrect alignment caused by lopsided load, misalignment of conveyor idlers, faulty splice and insufficient belt contact can result in edge wear, snagging, spillage and uneven tension. For difficult problems try return and troughing trainers.

LAG THE DRIVE PULLEYS
Top quality grooved lagging prevents belt slippage caused by wet or frosty conditions and prevents pulley wear. Bolted-on lagging eliminates need for carrying spare lagged pulleys and for time-consuming, expensive recovering.

DESIGN CORRECT LOADING CHUTE
Correct chute should place the material in the center of receiving belt in the direction of belt travel, at the belt speed and with no impact. Poor chute design results in damage to belt cover and carcass.

INSTALL SKIRTING RUBBER
This serves two purposes — prevents spillage at the loading point and properly shapes the load on the belt. Skirting should be all-rubber, not old conveyor belt. Allow for clearance as skirting should not come in contact with belt.

SET UP REGULAR INSPECTION SCHEDULE
Daily and weekly inspections will often reveal belt damage at excessive belt wear. Repairs or corrective measures can be immediately applied to prevent the damage from becoming more serious.

LUBRICATE THE IDLERS, BUT DON'T OVERDO IT
Except in extremely dusty or wet conditions, idlers should be greased only once every six months — otherwise, you may break grease seal and grease will rot the bottom cover of your belt.

INSPECT METAL FASTENERS FREQUENTLY
Keep fasteners tight. Replace worn or broken parts. If belt is broken at the fastener joint, cut back and re-fasten. Properly maintained fasteners will minimize splice failures, down-time and possible damage to the belt itself.

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"GLIDE RIDE" THE NEW MOVING SIDEWALK

This wall chart, 23" x 33" in two colors, has many valuable tips that will enable you to increase the life of your conveyor belting. To obtain a copy, contact

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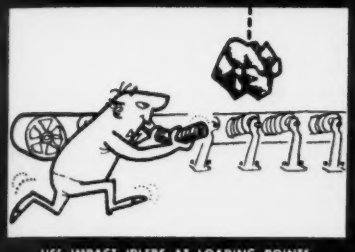
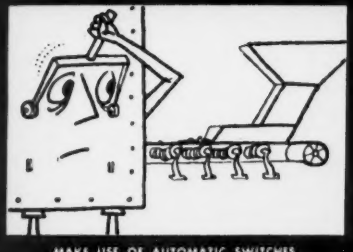
CONVEYOR BELTING

the answers



USE IMPACT IDLERS AT LOADING POINTS

Some of the shock of impact at such points is absorbed by these idlers, resulting in less strain both on the carcass and covers of the belt.



MAKE USE OF AUTOMATIC SWITCHES

These switches will shut down the belting in case it breaks, in case of excess slipping on the drive pulley, or if the feeders or chutes choke up.

REPAIR IMMEDIATELY CONVEYOR BELT DAMAGE

Unattended damage to the belt permits dirt and moisture to attack the fabric. Also, if the use of a damaged belt is continued, the impact and the sliding passage of injured areas over idlers and pulleys will enlarge the damage. The damaged spot should be cut out soon as noticed, and new rubber vulcanized into the hole.

Which is the best belt for you?

For Mining *(Metallic and Nonmetallic)*

Maltese Cross for especially severe service. Ajax for general heavy duty service, and Conservo for general light duty service. Exceptionally severe for special conditions may require use of specially designed Hewitt-Robirs belts such as Shock Pad, CR-50 and CR-70, Raynile and Super-Raynile, Ajax Underground and Monarch Neoprene fire-resistant belting.

For Metal Processing

Maltese Cross for exceptionally severe service. Ajax for general heavy duty service, and Monarch Neoprene for oily service. Maltese Cross Fiberglas Hot Material, Maltese Cross Fabric type Hot Material and Hewitt Hot Service are especially designed for hot material handling.

For Public Utilities

Monarch Neoprene for oily service, Maltese Cross Hot Material and Hewitt Hot Service for hot material handling. Maltese Cross for especially severe service and Ajax for general heavy duty service.

For Food Processing

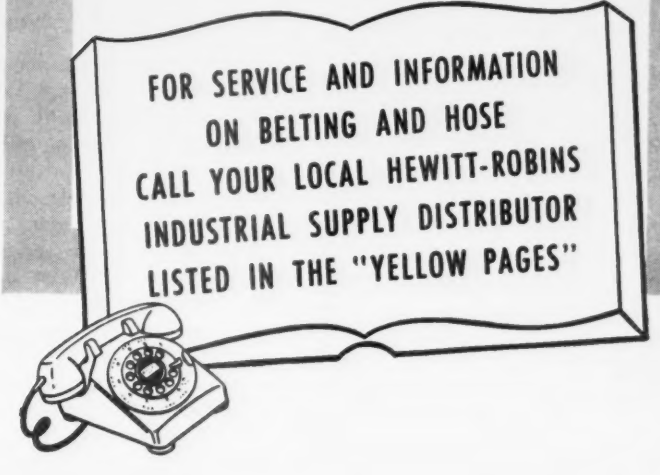
Canners and Packers and Hewlite for food handling, Monarch Neoprene for oily service, Ajax Rufftop, Conservo Rufftop and Conservo Transport for package handling. Monarch, Ajax and Conservo for grain and feed handling.

For Materials Handling

Conservo for portable conveyors. Ajax Rufftop, Conservo Rufftop, Conservo Transport and Hewlite for package conveyors.

For Chemical Processing *(Including Pulp and Paper)*

Maltese Cross for exceptionally severe service, Ajax for general heavy duty service, and Conservo for general light duty. Maltese Cross Fiberglas Hot Material, Maltese Cross fabric type Hot Material and Hewitt Hot Service are especially designed for hot material handling.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Circle 715 on Inquiry Card—Page 245

New Equipment and Supplies

Electronic Batch Weighing

is made fast and accurate by use of electronic load cells

Fairbanks-Morse & Co., 600 South Michigan Ave., Chicago 5, Ill.—A line of weighing instruments employing electronic load cells is said to provide accurate, fast weighing plus the convenience of remote weight indication. Included in the line is a system for batch weighing of any type of material that can be handled into the batch hopper by pipes, conveyors, or belts, or from overhead supply bins where materials are controlled by gates or valves. Each ingredient of a batch is pre-selected according to formula and automatically weighed and controlled through the batching operation. Auxiliary controls available include timers, batch counters and read-out devices. An automatic batch control unit that operates from a prepunched card also is available. Punched card formula control automatically insures exact duplication of formula every time. A formula can be used, the card filed away, and months or years later used again.

For More Details Circle No. 401—Page 245

Weight Slide Rule

calculates weight of shaped objects from known dimensions

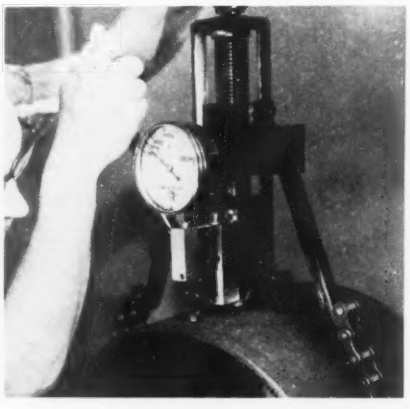
American Pattern, 772 Byrant St., San Francisco 7, Calif.—A newly developed weight slide rule facilitates figuring the weight of any shaped object from known dimensions. Calculations cover most materials, including aluminum, gray iron, steel, brass, copper and lead. Rounds, squares, hexagons, fillets, prisms, balls, hollow cylinders, wedges, cubes, cones, and irregular objects can be figured. The anodized aluminum face of the rule has black graduations with no-glare reading. A convenient instruction book outlines typical problems and shows how to find the answers.

For More Details Circle No. 402—Page 245

Portable Hardness Tester

uses an adapter to permit testing of large castings

King Tester Corp., 440-44 North 13th St., Philadelphia 23, Pa.—Use of an adapter with the company's standard brinell tester permits testing castings of unlimited size, it is claimed. The adapter is a chain device adjustable to the size of the piece to be tested. High strength chrome-moly steel arms hold chain to test head, allowing the head to



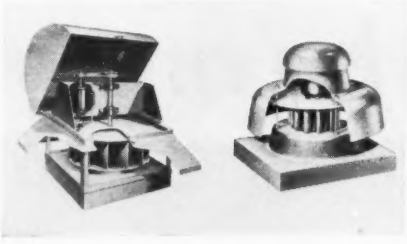
remain rigid while chain takes full thrust of load. Positive stops insure easy adjustment. Fast, accurate brinell readings are said to be obtainable regardless of size or shape of the castings tested.

For More Details Circle No. 403—Page 245

Ventilators

are designed for high efficiency and quiet operation

Burt Mfg. Co., 11 East South St., Akron 11, O.—Centrifugal ventilators are designed for high efficiency and quiet operation at slow speeds. These fan ventilators are available in a V-belt drive for capacities from 675 to 36,430 cfm and in a low profile model of spun aluminum for installations requiring lower capacities from 408 to 2,508 cfm. Both units have nonoverloading, backward curved blade fan wheel with motors in separate, air-cooled compartments insulated for quietness by resilient rubber vibration pads. The V-belt model is available in 13 basic sizes, three



basic damper types and motors in all power characteristics from 1/6 to 7½ hp. The direct drive units are offered in two basic sizes, four damper types and with motors ranging from 1/12 to ½ hp. It is a package unit ready to install on roof curb.

For More Details Circle No. 404—Page 245

Crucible Tongs

are suspended by a chain hoist from above the furnace

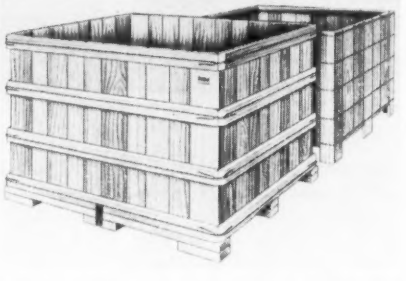
W. J. Hooker Ltd., 239-A Finchley Rd., London, N.W. 3, England — Mechanical crucible lift-out device consists of a tongs suspended by a chain hoist from above the furnace. A draw bar in the upper portion of the tongs keeps the jaws of the tongs open when it is lowered to the level of the crucible. This draw bar then is knocked out of position, allowing the jaws to grip the crucible. The greater the weight of the crucible the more firmly the jaws grip.

For More Details Circle No. 405—Page 245

Pallet Boxes

can handle, store or ship bulk loads weighing up to 3000 lb

General Box Co., 1825 Miner St., Des Plaines, Ill.—Standardized wirebound pallet boxes made in four sizes are available in regular or open



front form. The latter is available with or without gate. Boxes are assembled and knocked down easily for return in shipping operations. They can handle loads of 2000 to 3000 lb and may be stacked when necessary. Boxes are dimensioned to

For More Details on These Items
Use Reply Card—Page 245

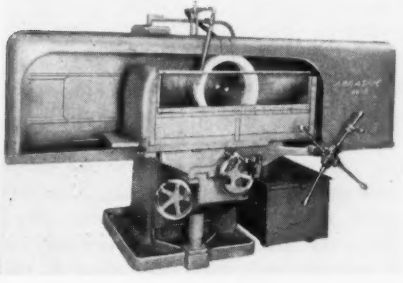
fit into regular railroad cars or trucks with a minimum of waste space. They are constructed of resawn hardwoods with outside cleats. An economical, one-time shipper which handles a 1500-lb load also is available.

For More Details Circle No. 406—Page 245

Face Grinder

incorporates motorized spindle, rugged base, knee and saddle

Abrasive Machine Tool Co., East Providence, R. I.—Face grinder is equipped with an 18-in., cup-shaped grinding wheel mounted perpendicular to the table. The motorized spindle is driven by a 15-hp, 900-rpm motor. Box type construction provides maximum rigidity for accuracy in grinding any flat or square surface and offers large bearing surfaces and easy maintenance. When used for



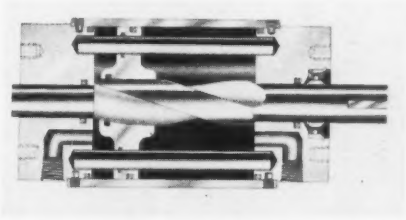
grinding steel and nonferrous castings it reduces the need for milling or planing and requires less stock to be left on for finishing. The machine is designed for flat, square surface grinding jobs.

For More Details Circle No. 407—Page 245

Rotary Actuator

operates on air, gas, water or oil at pressures of 5 to 500 psi

Carter Controls, Inc., 2800 Bernice Rd., Lansing, Ill.—Rotary fluid power actuator operates on air, gas, water or oil at pressures of 5 to 500 psi. It uses a piston and simple internal helix to deliver rotary motion claimed to be fast and positive. Applications include: Indexing, positioning, valve actuating, gate opening, mixing, tumbling, clamping and lifting. The actuator is available in 3, 4, 5, 6 and 8-in. diam. Standard rotation cycles are 0 to 100 degrees, 0 to 190 degrees, 0 to 280 degrees and 0 to 370 degrees. Actuator can be stopped at any point in the rotation cycle and held there indefinitely. The work



load is held firmly in position and cannot back off under reverse tension, shock or vibration even if a complete power loss occurs, it is claimed.

For More Details Circle No. 408—Page 245

Plastic Pattern Material

is used as a face coat for expendable plaster casts

Furane Plastics Inc., 4516 Brazil St., Los Angeles 39, Calif.—A newly developed powdered plastic material, when mixed with water, is used as a face coat for expendable plaster or gypsum cement casts which are to be used for laminates or castings. It is applied as a splash coat in the same manner as plaster or gypsum cements. After the material has set (about 15 minutes) gypsum cement-impregnated hemp fibre pads are laid in place. The procedure for making splash casts, master plaster patterns or plaster casts to be used in fabricating plastic jigs and fixtures is the same as with conventional plaster methods. The material is said to provide a hard surface that will not absorb water after setting.

For More Details Circle No. 409—Page 245

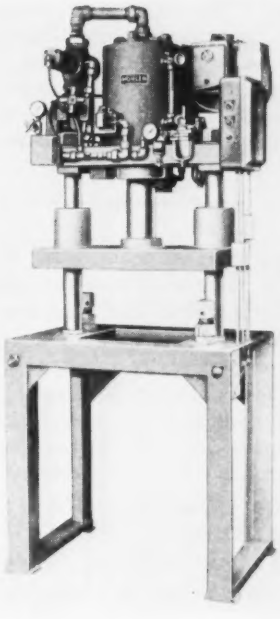
Testing Machine

uses electronic recorder to increase its versatility

Tinius Olsen Testing Machine Co., 5290 Easton Rd., Willow Grove, Pa. —Testing machines become more versatile with addition of an electronic recorder to be used in place of or in conjunction with the unit's

Trim Press Is Adaptable to Production Jobs

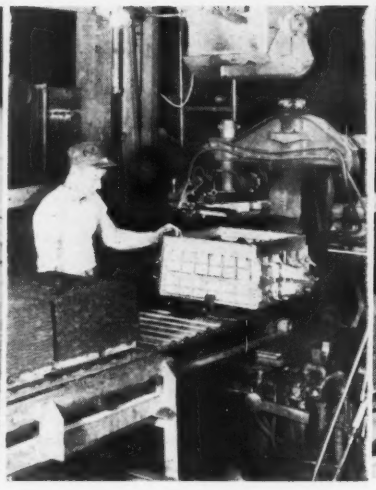
HIGH-SPEED 20-ton hydraulic trim press equipped with a 3-hp motor is designed for the die casting industry. The press operates at speeds in excess of 600 in. per minute free ram travel, at reduced speeds during trimming, shearing, forming and drawing operations. Vernier finger-tip controls govern speed. Electrical controls are designed for quick change from manual to automatic operations. The stroke is adjustable from zero to 12 in. with a shut height of 17 in. between platens. The upper platen has an 18 x 24-in. free area. The lower platen has a 15-in. square cut-out which can be eliminated or varied to suit customer needs. Working area between the uprights is 23 in. Additional equipment includes controls for selecting ram speeds of zero to 40 in. per minute during pressing operations and upclosing rams for double pressing action or for ejection operations. The hydraulic system is a closed, balanced circuit and the press is shipped with its full capacity of hydraulic fluid sealed in the reservoir. The area beneath, behind and on both sides of the press is open for use of



conveyors, chutes, barrels, buckets and other means of handling castings. Electric, air and water connections are at the top of the machine. The press is made by Mohler Engineering Co., 33 Roetzer St., Buffalo 11, N. Y.

For More Details Circle No. 438—Page 245

Gray iron pipe couplings are 12 in. in diam and 1 in. thick



Completed mold is deposited on an extension of roller conveyor

Operator has returned cope flask to machine, is removing the drag

Pit-Installed Machine Makes

PIPE COUPLING MOLDS

A PIT-INSTALLED jolt-squeeze machine is employed by James B. Clow & Sons Inc., Coshocton, O., to produce molds for pipe couplings at the rate of up to 160 molds a day. The molds are made from a matchplate in a 20 x 20 in. flask by one operator. The gray iron couplings are 12 in. in diameter and 1 in. thick.

Location of the machine in a pit provides a convenient height for the operator in moving finished molds onto a roller conveyor and in removing the heavy flasks from the molds.

The machine is an Osborn Roto-Lift, which permits one man to roll over a mold that is too large to be handled manually. In the molding sequence the drag is filled with sand from an overhead hopper and jolted. With a bottom board clipped in place, pick-up arms grasp split trunnions on the flask to raise it. The flask then is rolled over for the cope to be filled and squeezed. On the return stroke of the head, air clamps grip the flask and the cope is drawn. The drawn cope and head are swung to one side, the matchplate drawn from the drag and cores are set. The cope then is swung back and the mold closed.

As shown in one of the accompanying photos, an extension of the roller conveyor is moved over the machine table after the pick-up arms have lifted the mold. The conveyor section is moved back after the mold is deposited, and the flask is returned.

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standard dial indicator. In operation, the recorder plots any one of 12 testing ranges. Operator actuates a switch to set the range and the recorder automatically adjusts to the preset conditions of the test. Unit provides unlimited stroke within the height of the machine's columns.

For More Details Circle No. 410—Page 245

Vacuum Pump

maintains high pumping speeds over wide range of pressures

New York Air Brake Co., Kinney Division, Boston, Mass.—High-vacuum pump is a small version of company's two-stage mechanical booster pump. It consists of a water-cooled lobe type rotor pump driven through a flexible coupling by a 2-hp, 3600-rpm, 60-cycle, 3-phase, 220-v motor and backed by an air-cooled, compound pump coupled to a 1-hp, 640-rpm, 3-phase, 60-cycle, 220-v gear motor. Both pumps and motors are mounted on a common base. Unit operates automatically from atmospheric pressure down to 0.1 micron (0.001-mm Hg) McLeod.

For More Details Circle No. 411—Page 245

Sequence Valves

are for controlling sequencing type air circuits

Ross Operating Valve Co., 107 East Golden Gate Ave., Detroit 3, Mich.—Sequence valves provide for a preset pattern to be automatically carried out by a machine after the operator initiates the cycle. Cylinders can be sequenced by position or time and their action interlocked in the circuit. When pilot valve is operated, it provides the remote control valve with air through an opening in the head reversing the valve. Exhausting the pilot valve circuit returns the retrold valve to its normal position. Three types of valve heads control these valves—immediate actuation and immediate reversal, delayed actuation and immediate reversal and immediate actuation and delayed reversal. Available models include straightways and three-ways, normally opened and normally closed. They are provided for in-line mounting in sizes ¼ to 1¼ in.

For More Details Circle No. 412—Page 245

Motor-Driven Pulley

is for electric hoists of 1000 to 2000 lb capacity

Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division, Muskegon, Mich.—Lightweight, single speed, pushbutton-controlled, motor-driven trolley is for installation on electrically powered hoists having capacities of 1000 to 2000 lb. Trolley is available with optional traversing speeds of 65 to 100 fpm. Models can be supplied for all standard voltages;

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461. Pattern Equipment

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.—Complete line of material and supplies for the patternmaking industry are presented in catalog O. Dust collectors, air control valves, aluminum plates, cope and drag plates (aluminum with cast-in steel inserts), rapping plates, aluminum melting furnaces and matchplate vibrators are among the items covered.

462. Fume Control System

Martin Equipment Co., Box 173, Wabash, Ind.—Bulletin 555 illustrates and describes a fume control system that reportedly ventilates pouring operations with use of 2500 cfm of air and can be installed on any production pouring line.

463. Woodworking Machine

DeWalt Inc., Lancaster, Pa.—Booklet SP-41-56 discusses the operation and use of a multipurpose radial arm machine that reportedly does everything in woodworking. More than 100 photographs show applications of the basic machine and its accessories.

464. Moisture Control

Haylco Controls Corp., Neenah, Wis.—Bulletin describes an automatic sand moisture content unit that controls moisture content while the sand is being mixed. Unit's sensing probe is in the mixer and water is added automatically in stages to bring moisture content to desired level during normal mulling cycle.

465. Spectrograph

Jarrell-Ash Co., 26 Farwell St., Newtonville, Mass.—Catalog SL-456 provides performance and application details of three high precision industrial spectrographs.

466. Refractories

Walsh Refractories Corp., 101 Ferry St., St. Louis 7, Mo.—Information sheet offers general application data on company's high temperature cements, plastics, castables, coatings and super duty fire brick.

467. Foundry Practice

Foundry Services Inc., 200 Bruck St., Columbus 7, O.—Technical service bulletin No. 3 discusses shrinkage porosity in small bronze castings, how design is affected by foundry practice, aluminum sand casting defects and an analysis of scrap with emphasis on causes and cures.

468. Abrasive Wheel

Minneapolis Mining & Mfg. Co., Dept. DT-115, St. Paul 6, Minn.—Bulletin contains two case histories highlighting performance of newly developed cloth-backed coated abrasive polishing-buffing wheel.

469. Conveyor Trolleys

Anchor Steel & Conveyor Co., Dearborn, Mich.—Bulletin 56-2 announces improved, low-friction, 4 and 6 in. overhead conveyor trolleys. Special

FOUNDRY INQUIRY CARD

Circle item number for further information on anything described or advertised in this issue **SEPTEMBER 1956**

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419	444	469	494	519	544	569	694	619	644	669	694	719	744
420	445	470	495	520	545	570	595	620	645	670	695	720	745
421	446	471	496	521	546	571	596	621	646	671	696	721	746
422	447	472	497	522	547	572	597	622	647	672	697	722	747
423	448	473	498	523	548	573	598	623	648	673	698	723	748
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756	766	776	786	796	806	816	826	836	846	856	866		
757	767	777	787	797	807	817	827	837	847	857	867		
758	768	778	788	798	808	818	828	838	848	858	868		
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trolley designs of heavy load-light pull and heavy-duty attachments also are described.

470. Welding Products

Weldaloy Products Co., 11551 Stephens Rd., Van Dyke (Detroit), Mich.—Catalog contains information of reference value to resistance welding engineers. It describes and specifies standard and special spot welding electrodes, seam welding electrode wheels, dies, back-up bars, shafts and bushings. Alloy specification charts and a glossary of metallurgical processing and production terms are included.

471. Aggregate Dryers

Barber-Greene Co., Aurora, Ill.—Information sheet describes operating principles of mineral aggregate dryers that have been successful in drying foundry sand, slag and insulating material. Capacities range from 3 to 200 tons per hour depending upon material being dried and amount of moisture to be removed.

472. Business Service

Manufacturers Purchasing Exchange, 22 West Madison St., Chicago 2, Ill.—Booklet details the aims of a mechanized service designed to aid industrial buyers seeking sources of supply or services.

473. Vibrating Feeders

Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13, O.—Bulletin 1000 offers general information and capacity in feet per second and tons per hour of company's various sized air-powered vibrating feeders for moving sand across standard trays mounted horizontally.

474. Sand Preparation

Beardsley & Piper Division, Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Dimensions, specifications, photographs, diagrams, construction features, engineering data and general information on line of sand preparation machinery designed for various foundry operations are offered in bulletin 1230.

475. Fork Lift Trucks

Towmotor Corp., 1226 East 152nd St., Cleveland 10, O.—Literature SP-23 contains photographs highlighting features and advantages of line of gasoline, diesel and LPG powered fork lift trucks with capacities from 6000 to 11,000 lb. Standard specifications for the trucks are found in literature F2.

476. Overhead Cranes

Chicago Tramrail Corp., 1330 South Kostner Ave., Chicago 23, Ill.—Bulletin U-200-1 contains dimension drawings, specifications, photographs and electrical information on line of motor driven, hand geared and push type underhung overhead cranes.

477. Vibratory Equipment

Eriez Mfg. Co., Erie, Pa.—Brochure VB-1 describes electropermanent magnetic vibratory equipment consisting of vibratory feeders and unit feeders. Applications and operating advantages are listed.

478. Material Handling

Cleveland Crane & Engineering Co., Cleveland Tramrail Division, Wickliffe, O.—Revised booklet 2008-M covers the principal components of overhead material handling systems. Track design, carriers, tractors, switches, cranes, safety electrification, buckets and grabs are among the subjects covered.

479. Hydraulic Cylinders

Hydro-Line Mfg. Co., 5682 Pike Rd., Rockford, Ill.—Bulletins 52, 53 and 55 are incorporated into a binder to provide mounting data, features, specifications, dimensions and engineering data on air and hydraulic cylinders that meet all JIC standards.

480. Saws

Ty-Sa-Man Machine Co., 1015 White Ave., Knoxville, Tenn.—In-use photographs, construction features and specifications for cut-off, abrasive, friction and long-cut saws are in catalog 1235.

481. Belt Idler

Joy Mfg. Co., 307 Oliver Bldg., Pittsburgh 22, Pa.— Descriptions, dimensional drawings, specification tables and suggested applications for cable suspension idlers for belt conveyors are found in bulletin LD-105.

482. Wire Rope Slings

American Chain & Cable Co., Wire Rope Sling Dept., Wilkes-Barre, Pa.—General information on wire rope slings for any and all lifting applications is found in folder DH-532A.

483. Roof Ventilators

Hartzell Propeller Fan Co., Piqua, O.—Revised bulletin A-112A provides sizes, specifications, performance data and dimensional drawings covering line of roof ventilators.

484. Flow Control Valves

Humphrey Products, subsidiary of General Gas Light Co., Kalamazoo, Mich.—Form V-356 illustrates and

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describes line of flow control valves intended for use in applications that require either manual or automatic valving of air, water, oil or freon.

485. Hydraulic Hose Selector

Wiretex Hose Dept., Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O.—Hydraulic hose selector contains SAE and industry specifications on hydraulic hose. Starting with any known factor, a designer or maintenance man can use the selector to determine a proper control hose for his needs.

486. Bonding Clay

Baroid Division, National Lead Co., Railway Exchange Bldg., Chicago 4, Ill. — Features, applications and physical characteristics of bonding clay for molding, coremaking and high-refractory core wash formulations are offered in folder R & C-155-HMC.

487. Storage Racks

American Metal Products Co., 5959 Linsdale Ave., Detroit 4, Mich.—Capacity charts, construction features, installation information on stationary type pallet, skid, drum and barrel and tool and die storage racks are contained in catalog.

488. Exhaust Hoods

American Air Filter Co., 215 Central Ave., Louisville 8, Ky.—Bulletin 270-E3 is a manual of exhaust hood designs engineered for the woodworking industry.

489. Wound Rotor Motors

Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Construction features of wound rotor motors for driving fans, blowers, hoists, lifts, cranes, machine tools, presses, conveyors, crushers, mills and similar applications are found in bulletin 51B8195A.

490. Oxidizing Bars

Cleveland Electro Metals Co., West 38th St. and Nickel Plate Railroad, Cleveland 13, O.—Bulletin illustrates and describes specially designed castings of metallurgical grades of aluminum to be wedged on the end of a steel rod and plunged into molten steel in either furnace, ladle or stream as an oxidizing agent.

491. Dust Collector

Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md. — Photographs, drawings, dimensions, weights and capacities of equipment for wet collection of industrial dusts are found in bulletin 920.

492. Powder Cutting

Hoeganaes Sponge Iron Corp., Riverton, N. J.—Bulletin 1051 lists applications of iron powder processes for cutting, scarfing, gouging, lancing and washing in foundries, steel mills and scrap yards.

493. Cast Steel Gears

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.—"Moly Steels for Cast Gears" explains the advantages of molybdenum alloys which permit reduction in size and weight of cast steel gears.

494. Laboratory Service

Frank L. Crobaugh Co., Cleveland Chemical and Engineering Service, 1426 West 3rd St., Cleveland 13, O.—Folder lists the research, development, engineering, quality control and testing services available in laboratories of company that serves as consultants to foundries, processing and metal finishing industries.

495. Solenoid Valves

Numatics Operating Valves, 106 South Main St., Milford, Mich.—Features, selection charts, dimensions, operating data, ordering specifications and general information on series of solenoid-actuated control valves for air, vacuum and low pressure liquids are found in bulletin 8000.

496. Process Instruments

General Electric Co., Schenectady 5, N. Y.—Bulletin GEC-1362A describes ranges, dimensions and mounting of types HE and HJ indicators, recorders and recording controllers.

497. Storage Racks

Unistrut Products Co., 1013 Washington Blvd., Chicago 7, Ill.—Catalog 600 presents construction details, bas-

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Circle item number for further information on anything described or advertised in this issue **SEPTEMBER 1956**

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402	427	452	477	502	527	552	577	602	627	652	677	702	727
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ic material sizes and ordering information on framing material engineered for construction of storage racks to meet storage and material handling problems.

498. Tractor Shovels

Frank G. Hough Co., Libertyville, Ill.—A variety of bulk material handling applications for company's tractor shovels are described and illustrated in form 304. Specifications covering seven models also are included.

499. Welding Helmets

Mine Safety Appliance Co., 201 North Braddock Ave., Pittsburgh 8, Pa.—Bulletin 0303-4 describes line of plastic impregnated glass fiber welding helmets said to be lightweight, strong and resistant to heat, moisture and rot.

500. Air Control Valves

Airmatic Valve Inc., 7317 Associate Ave., Cleveland 9, O.—Catalog illustrates line of 2, 3 and 4-way air control valves for high or low pressure installations. Features, application data, dimensions and parts list breakdown are provided.

501. Electric Fork Truck

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.—Design specifications and drawings, photographs, operating views and application data on a 3000 lb capacity electric fork truck are provided in folder.

502. Cable Hoists

Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, O.—Form 65510 provides condensed feature descriptions and specifications on a series of cable hoists with capacities from 6000 to 20,000 lb.

503. Control Valves

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.—Bulletin 260 illustrates a series of solenoid and master air valves used for controlling air cylinders and other air-operated devices.

504. Axial Roof Ventilator

Detroit Blower Co., 9867 Pacific Ave., Franklin Park, Ill.—Bulletin DWA-101 provides information and performance tables on a silent vent axial roof ventilator with a mushroom-shaped dome.

505. Dust Collectors

Torit Mfg. Co., 292 Walnut St., St. Paul 2, Minn.—Booklet, "You Can Solve That Dusty Cost Problem," describes the principles of unitized dust collection, its advantages and savings.

506. Accessories Catalog

J. N. Fauver Co., 51 West Hancock, Detroit 1, Mich.—Catalog 17-E contains general information, specifications and prices of installation accessories for lubrication, hydraulic, steam, liquid and air applications.

507. Fluid Power Cylinders

E & S Mfg. Co., 2971 East 63rd St., Cleveland 27, O.—Engineering data, table of dimensions, rod dimensions and information on line of fluid power cylinders are in bulletin 100.

508. Material Handling

Kwik-Mix Co., Port Washington, Wis.—Versatile material handling unit is illustrated and described in folder KM398. Application photographs, specifications and performance data are included. Hopper body, platform bed or fork lift accessories are available for the unit.

509. Vibratory Equipment

Syntron Co., 540 Lexington Ave., Homer City, Pa.—Catalog 564 contains technical data, brief description and photographs of vibratory material handling equipment.

FOUNDRY Reprints

510. Die Casting Alloys

Die Casting Alloys by M. R. Tenenbaum presents analyses of the common die casting alloys with some rules of thumb to provide the man in the shop with background for improvement of operating procedures. Accent is on selection, handling and melting of the more common alloys.

511. Shell Molding

Thermal Studies in Shell Molding by Wylie J. Childs and J. B. Hyman reports on a study of the temperature of shells during investment, curing and pouring operations. Data can serve as a guide in selection of thickness and strength of shells.

512. Gas Turbine

The Automotive Gas Turbine — A Challenge to Foundries by Robert H. Herrmann discusses the automotive gas turbine engine in its present state of development with emphasis on problems to be overcome if foundries are to provide any of its components.

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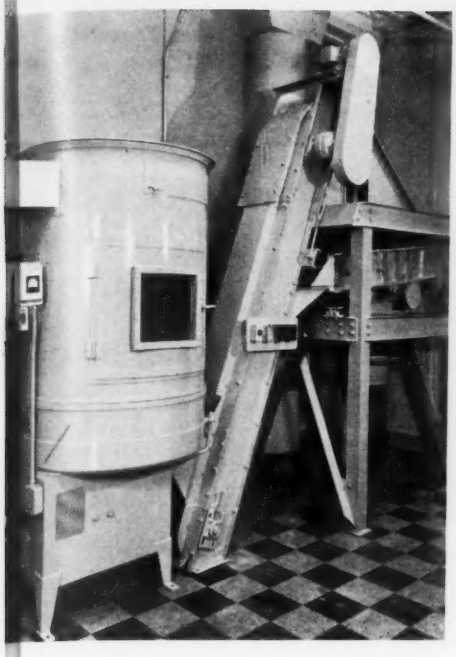

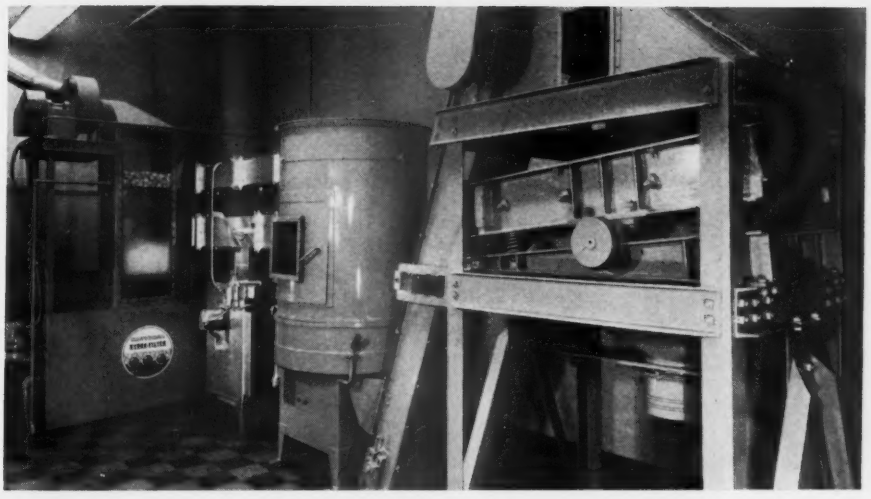

Offers Testing Facilities for

RESIN-COATED SAND

FACILITIES for processing test batches of resin-coated sand are being offered by National Engineering Co. in a new service laboratory completed recently at its Chicago headquarters.

Called the Shell-Mull Performance Laboratory, it is equipped with a production-size unit of National's newly developed sand coating system. This unit consists of a mixer, heater, exhaust system, elevator, vibrating screen and dust collector. It is capable of producing 800 to 1200 lb of coated sand per hour.

Foundry operators are being invited to run coating tests, using their own sand and any resin. They are also invited to have their own operators and resin suppliers witness the operations. The new facility is designed to assist foundrymen with coated sand problems, as well as to demonstrate the operating characteristics of National's new sand coating equipment.

The equipment is designed to reduce sensitivity to variations in mixing time, temperature, etc. It is claimed that this design provides a highly uniform coating of high tensile strength which minimizes the amount of resin required. The separate heater provides positive control of sand and air temperature. While the muller in the unit pictured here handles 200 to 250 lb of sand per batch, any standard model Simpson Mix-Muller can be used in the system to provide capacities of up to 4000 lb per batch.

Arrangements for use of the testing facilities can be made by writing Shell-Mull, National Engineering Co., 549 West Washington, Chicago 6. A sand sample of 600-800 lb shipped in 100-lb bags will be required, plus specific data such as type and percentage of resin, screen size and type of sand used. Completed samples will be returned to the foundry for production tests.

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and can be purchased as a factory installed unit in combination with company's other hoists or separately in kit form for adaptation to existing hoists.

For More Details Circle No. 413—Page 245

Burn Relief Spray

treats burns and protects skin from secondary infection

General Scientific Co., 27th and Huntingdon Sts., Philadelphia 32, Pa.—Aerosol spray bomb treats burns and protects skin from possible secondary infection. The film deposited by the spray isolates the burn and keeps skin moist and soft. It eliminates the need for bandages or dressings. The spray contains analgesic agents to alleviate pain and hexachlorophene for infection prevention. Spray is packaged in 5-oz cans.

For More Details Circle No. 439—Page 245

Welding Cable Reel

can handle 100 ft of cable and can be mounted anywhere

United Specialties Inc., P.O. Box 698, El Dorado, Ark.—Welding cable reel can handle up to 100 ft of 2/0 cable at 300 amps. A heavy-duty spring and gear mechanism retracts cable when not in use. Locking pawl arrangement locks cable at any desired length. Construction permits mounting in any position on floors, walls, ceilings or on mobile equipment.

For More Details Circle No. 414—Page 245

Service Stickers

are part of system for keeping wire rope service records

H. K. Porter Co., Leschen Wire Rope Division, 2727 Hamilton Ave., St. Louis 12, Mo.—Service stickers resembling those applied to the family automobile to record oil changes are available to be applied to wire rope using equipment. Stickers then become part of a fact-finding system aimed to increase wire rope operating efficiency and to help reduce supply and maintenance costs by furnishing comparative data on wire rope types, constructions and makes.

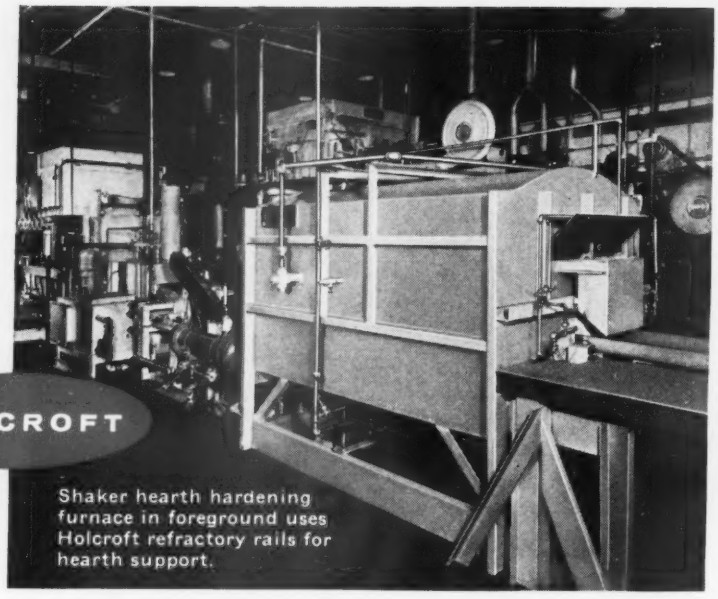
For More Details Circle No. 415—Page 245

Drum Cradle Truck

has long, wide wheel base for safe operation and rolling ease

Morse Mfg. Co., 727 West Manlius St., East Syracuse, N. Y.—Drum cradle truck has a retracting caster frame which provides a long, wide wheel base. The frame swings inside the rockers while the drum is being rocked up and loaded. It then is thrown forward by pressure

BLAZING THE HEAT TREAT TRAIL— WITH HOLCROFT



Shaker hearth hardening furnace in foreground uses Holcroft refractory rails for hearth support.

LET'S TALK ABOUT

REFRACTORY RAILS

With the current shortage of nickel, furnace manufacturers are looking for ways to replace or conserve this scarce commodity. It is interesting to note that Holcroft tackled this same problem during World War II when a nickel shortage also faced the industry.

In 1945 we designed and installed a pusher tray gas atmosphere furnace that used refractory skid rails instead of the nickel chrome alloys used at that time. Since then we have expanded their use to many other comparable applications so that now there is positive proof that properly designed installations of refractory skid rails last much longer, under similar conditions, than those made from nickel alloys. Replacements have been negligible—performance has been superior—material costs have been lower—and a marked decrease in wear on work carriers has been noted.

Yes, today a nickel shortage still exists—but Holcroft offers a job-proven answer, not only for the rails but for other vital parts of a heat treat furnace as well. You can bank on Holcroft's engineering leadership and experience—the kind that saves not only nickel—*but dollars, too!* Write for information.

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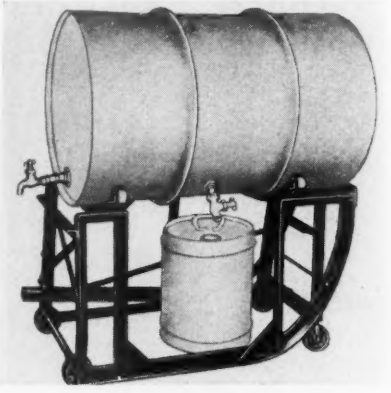
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • DARIEN, CONN. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • PHILADELPHIA, PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

Circle 716 on Inquiry Card—Page 245

on a foot lever, placing the casters well in front of the truck. A safety catch is located on the nose piece to prevent the drum from slipping while being loaded. A side opening is provided for drums which must



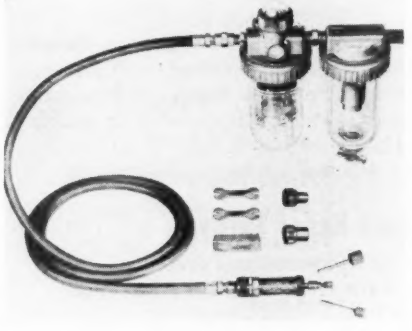
be tapped from the side. The truck has four 3-in.-diam wheels supported by cross braces to provide easy rolling of the loaded truck into dispensing position. Four 2½ in. rollers mounted on top rails help position the bungs of 55 and 110-gal drums. Truck also is available with a shorter wheelbase to accommodate 30-gal drums.

For More Details Circle No. 416—Page 245

Air Grinder

has a rotary valve to provide speed control up to 50,000 rpm

Buckeye Tools Corp., Div. 16, P. O. Box 966, Dayton 1, O.—High-speed, vane-type grinder has been developed for precision, detailed grinding. The tool is 3¾-in. long and weighs 3½ oz. Rated capacity is ½-in. mounted point or grinding wheel. Tool has ⅛-in. precision-



ground collet. A rotary valve provides infinite speed control from zero to 50,000 rpm. Ball bearing motor mounts maintain spindle precision. Grinder is available in kit form with all accessories packaged in a tool storage box. Kit includes grinder, three nose pieces, three mounted points, two collet wrenches, dressing stone, 5 ft of air hose and couplings, and a fog-type filter-lubricator. A

The accompanying chart is tangible evidence of PROGRESS. It shows that, in nine years' time, FEF has stimulated enough interest among engineering colleges to increase the value of teaching facilities — foundry laboratories — over $1,296,700.

It's up to you . . . foundrymen, foundry equipment manufacturers, foundry suppliers . . . to keep this progress going.

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To determine your stakes in this worthwhile effort, write for booklet "Let's Look Ahead".

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Foundry Educational Foundation

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second kit includes similar accessories except the filter-lubricator. The tool also is available as a separate unit.

For More Details Circle No. 417—Page 245

Welding Electrode

is for all position welding of mild and low alloy steels

Air Reduction Sales Co., Division of Air Reduction Co. Inc., 150 East 42nd St., New York 17, N. Y.—A low-hydrogen electrode with iron powder added to the coating for high welding speeds has been developed for all position welding of mild and low alloy steels. Features of the new electrodes include smooth arc action, low spatter loss, high welding speed and sound weld metal.

For More Details Circle No. 418—Page 245

Ventilated Safety Suit

is for workers exposed to temperatures of 130° F or higher

Union Industrial Equipment Corp., 175 Main St., White Plains, N. Y.—Air-supplied suit provides comfort and health protection for workers exposed to temperatures of 130° F or above. The suit permits working in 175° F atmospheres on a work schedule of 105 min out. Coveralls are made from flame-resistant cotton, Dynel or any other fabric specified. A removable air manifold is included at the back, from which the air is distributed through flat, flexible tubes. The

manifold and component parts are detachable for cleaning and laundering. Air at 90 to 110 psi is supplied at 200 to 250 cfm through a ½-in. air hose. A headpiece consisting of a safety helmet and hood are available as a companion piece to the suit. Air flow at the neckline of the suit can be regulated to circulate under the hood, allowing complete breathing and cooling comfort.

For More Details Circle No. 419—Page 245

Belt Dressing

preserves and reduces slipping of various belt materials

Cling-Surface Co., 1044 Niagara St., Buffalo, N. Y.—Belt dressing dispensed by a pressurized container preserves and reduces slippage of leather, cotton, fabric, rubber and fiber belts. The spray dispenser makes application of the company's belt dressing easier, safer and with minimum waste.

For More Details Circle No. 420—Page 245

Insulating Blanket

keeps its form and properties at temperatures up to 2300°F

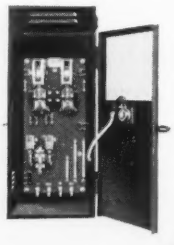
Carborundum Co., Niagara Falls, N. Y.—High-temperature insulation blanket of fine, closely intertwining aluminum silicate fibers is said to keep its form and properties at temperatures up to 2300° F. Because of its insulating qualities, a high thermal gradient through a minimum

For faster load discharge... low cost operation... longer life...

EC&M Magnet Controllers have earned a reputation for improved magnet operation. Loads are discharged quickly . . . cleanly . . . without "dribble". Magnets "work more" because faster drops eliminate "positioning" the magnet at point of discharge.

A simple two-position (lift-drop) Master Switch makes operation easy . . . power is off when the master switch is in the drop position. This prevents overheating, keeps lifting capacity high, and substantially adds to magnet life.

EC&M Controller has exclusive adjustable discharge feature for different type loads. (Dial on door).



EC & M MAGNET CONTROLLERS

SQUARE D COMPANY
EC&M DIVISION • CLEVELAND 28, OHIO

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serve you
better...

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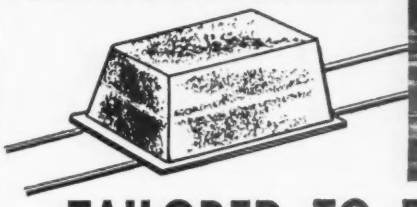
Thiem

PRODUCTS, INC. • Milwaukee 14, Wis.
MANUFACTURERS OF FOUNDRY PRODUCTS EXCLUSIVELY

Circle 719 on Inquiry Card—Page 245

NOMAD

CONVEYOR SYSTEMS



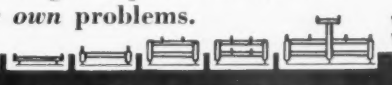
...TAILORED TO FIT YOUR NEEDS

There is a "just-right" piece of Nomad equipment to do the job whether for basic foundry needs or for fully powered mold handling line consisting of mold dump, pallet raiser or elevator. In each case your foundry layout will be space-saving and compact with increased efficiency and high profit-making production.

Nomad Foundry Equipment is adaptable for use by big mechanized foundries or for the smaller foundry who wants to modernize.

Write for more information on "cutting the pattern" to suit your *own* problems.

Mold handling mechanism and pallets pat.



NOMAD FOUNDRY EQUIPMENT

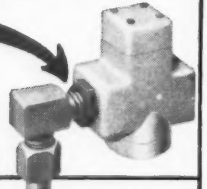
WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

Circle 720 on Inquiry Card—Page 245

TRU-O-SEAL TEFLON SEAL

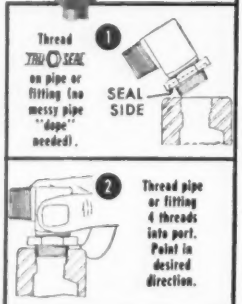
PAT. PENDING

STOPS PIPE THREAD LEAKS instantly!



Prevents future leaks!

TRU-O-SEAL does away with messy pipe "dope" compounds, eliminates damage caused by overtightening of conventional leaky joints, and is immune to ALL known hydraulic fluids and to steam, air, water, solvents, and practically all gases and chemicals. It withstands temperatures from —100° F. to plus 500° F., saves cost and labor of special or welded fittings, and has been fully field tested and proven by leading manufacturers. Comes in ⅛" to 2½" pipe thread sizes.


1
Thread TRU-O-SEAL on pipe or fitting (no messy pipe "dope" needed).
SEAL SIDE
2
Thread pipe or fitting 4 threads into port. Point in desired direction.
3
Tighten TRU-O-SEAL to complete leakproof assembly (only light torque required).

Write for data and prices

TRU-O-SEAL DIVISION
Flick Reedy Corporation
2034 N. Hawthorne Melrose Park, Ill.
"Miller Fluid Power" is also a Div. of Flick-Reedy Corp.

We invite you to see Our Exhibit at

BOOTH #1623
METAL SHOW
Oct. 8-12

PUBLIC AUDITORIUM
CLEVELAND

Circle 721 on Inquiry Card—Page 245

thickness blanket is effected. Where indicated, other low temperature blankets may be used in combination to reduce heat loss further. Blankets may be used on high-pressure steam lines, diesel exhausts, gas turbines, furnace ducts and as insulation lin-

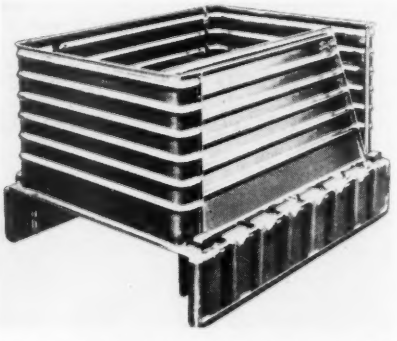
ing in alloy and refractory furnaces without harm from the furnace atmosphere. The blankets are available in 25-ft rolls 12 in. wide and at a thickness of ½-in. Other sizes are under development.

For More Details Circle No. 421—Page 245

Material Handling Box

collapses and can be reduced to 1/5 of its original size

Republic Steel Corp., Pressed Steel Division, 6100 Truscon Ave., Cleveland, O.—Collapsible, corrugated steel material handling box can be reduced to one-fifth of its original size for use as a returnable shipping container or for general plant use. It



can be stacked when loaded, unloaded or folded and has no removable parts. Sides are locked by a pin and slide bolt arrangement to provide rigidity.

For More Details Circle No. 422—Page 245

Powered Wheelbarrow

has power-flow transmission as standard equipment

Kwik-Mix Co., Port Washington, Wis.—Automatic power-flow transmission has been added as standard equipment to company's powered wheelbarrows to increase speed, power, operating ease and production ca-

Save 80% power cost!
Save 30% wheel cost!

THOR

360 CYCLE HIGH FREQUENCY

ELECTRIC GRINDERS

Remove metal 25% faster!

FOR removing metal with maximum speed at minimum cost, no other power tool even comes close to the performance of Thor 360 Cycle High Frequency Electric Grinders.

This Thor Grinder will remove up to 25% more metal than a comparable air grinder can remove in the same time. By using wheels designed for speed, you get maximum cutting power from the abrasives, and save up to 30% on wheel cost. Because efficiency is constant, with never more than 8% loss of speed under full load, you save 80% on power cost. Records prove that the minimum overall saving is 30%.

There is no governor control on a Thor 360 Cycle Grinder. Electric power frequency controls the speed, making it as reliable as an electric clock. The mechanical simplicity of the 3-phase Thor induction motor assures long service and low maintenance cost.

Thor 360 Cycle Grinders are made in five models and 21 speeds, from 3700 to 21,600 R.P.M. Thor's complete line of high frequency electric, universal electric, and air grinders includes sizes, speeds and capacities for every industrial need. Thor also offers a complete line of grinder accessories. Thor Power Tool Company.

Model G37 . . . 17½" long . . . Weight 8½ lbs. . . . RPM 6,000, 8,000, 9,500, 12,000

Thor PORTABLE POWER TOOLS

THOR POWER TOOL COMPANY

Aurora, Illinois

ATLANTA • BIRMINGHAM • BOSTON • BUFFALO • CHICAGO
CLEVELAND • DENVER • DETROIT • HOUSTON
KANSAS CITY, MO. • LOS ANGELES • MILWAUKEE • NEWARK
LONG ISLAND CITY, N.Y. • PHILADELPHIA • PITTSBURGH
ST. LOUIS • SAN FRANCISCO • SEATTLE • TORONTO, CANADA
EXPORT DIVISION, NEW YORK CITY

Circle 722 on Inquiry Card—Page 245

pacity. Speed has been increased to 12 mph. The power ratio of 4 to 1 multiplies engine torque range as much as 200 per cent, according to the manufacturer. Grades up to 25 per cent can be negotiated by the unit when carrying a full load of 2000 lb.

For More Details Circle No. 423—Page 245

Respirator

offers protection against air-borne particles

Mine Safety Appliances Co., 201 North Braddock Ave., Pittsburgh 8, Pa.—Six-ounce, ultra-filter respirator is said to offer protection against minute particles, including radioactive dust and air-borne organisms. The aluminum facepiece can be formed easily by the fingers to fit contours of the wearer's face. This, plus a carefully designed facepiece cushion, is said to provide an air-tight seal on almost any facial type. The facepiece cushion is made of neoprene sponge material which is durable and will not harden with use. Design of the respirator allows full vision and freedom of head movement. Filter units can be slipped in or out easily for quick changing or when cleaning the respirator.

For More Details Circle No. 424—Page 245

Portable Hand Crane

is lightweight but has a lifting capacity of 250 lb

Lewis-Shepard Products Inc., Watertown, Mass.—Portable hand crane has a capacity of 250 lb with a lifting height of 66 in. Boom is 25 in.

long and over-all height is 80 in. Unit is light weight and equipped with 6-in. swivel casters on front and 7-in. rear wheels for maneuverability. A foot-operated floor lock holds crane stationary. Loads are cranked up or down and held at any point with a gear winch. Each revolution of the crank winds up 6 in. of cable. Crane can be used for die handling, maintenance or general shop work.

For More Details Circle No. 425—Page 245

Turbo Blowers

supply dependable air pressure to gas or oil burners

Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Turbo blowers for supplying air to gas or oil burners are said to provide constant, dependable air pressure throughout a broad range of volume without pulsations, surgings or vibrations. Flat pressure performance curves reportedly make the blowers desirable for air-fuel proportioning burners. Blowers are made in sizes from 250 cfm at 8 oz pressure to 2650 cfm at 24 oz pressure.

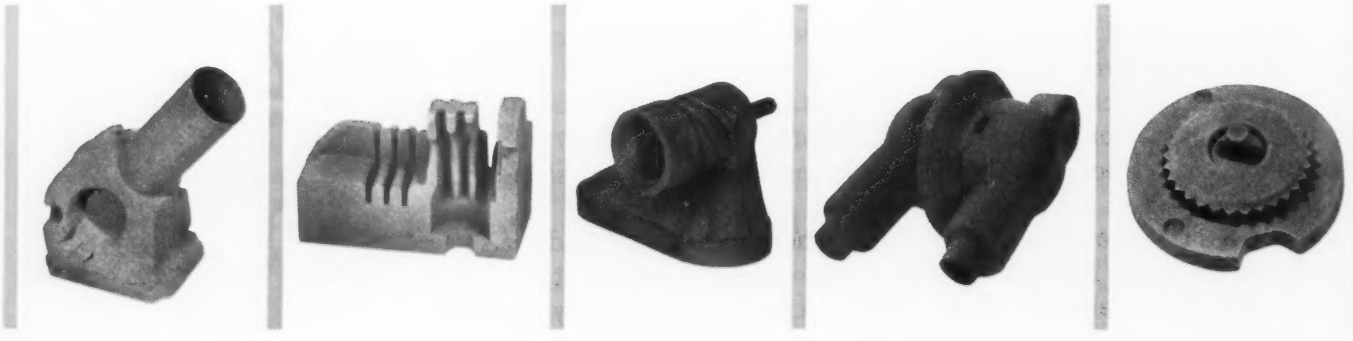
For More Details Circle No. 426—Page 245

Air Pressure Regulator

is for reducing air pressure from lines of up to 400 psi

C. A. Norgren Co., 3401 South Elati St., Englewood, Colo.—Air pressure regulator is a 2-in. pilot-controlled, high capacity regulator for accurate reduction of air pressure

Setting new uniform standards in cores and castings . .



7143-SI

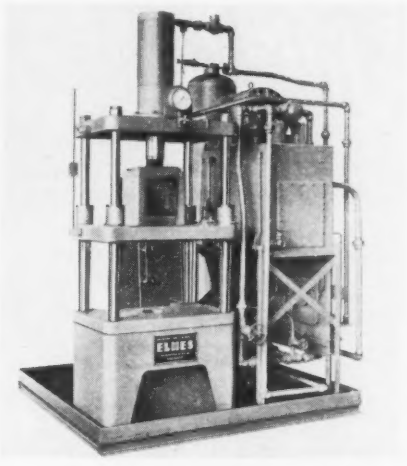
from line pressures of up to 400 psi to working pressures of from 2 to 125 psi. Its temperature range is from −40 to +200° F. The unit has high air flow capacity with large, unrestricted air passages and a large diameter valve seat. A pressurized chamber provides the control medium. The regulators are said to be compact and simple to install where space is a problem. Remotely controlled, they can be installed at any point in an air system. The pilot regulator then can be installed in any convenient location for easy adjustment of working pressure.

For More Details Circle No. 427—Page 245

Die Casting Press

is custom engineered to meet special production needs

American Steel Foundries, Elmes Engineering Division, 1150-A10 Tennessee Ave., Cincinnati 29, O.—Accumulator-operated die-casting press is designed for casting motor rotors by dunking into a pool of molten aluminum. Machine is a package unit consisting of press, accumulator, pump, valve subplate, and control panel mounted on a common one-piece base plate. The hydraulic circuit is designed for pushbutton operation with use of a fire-resistant fluid. An operator ladles in the molten aluminum and closes the safety door which initiates the press cycle. Both loading and unloading are automatic. The press platen is guided



and held parallel throughout the stroke by the four columns. The accumulator system permits full pressing force at maximum speed immediately at contact with the molten aluminum. Valves are subplate mounted for easy removal for servicing when necessary.

For More Details Circle No. 428—Page 245

Control Valves

have long life and can control over 600 cycles per minute

Valvair Corp., 454 Morgan Ave., Akron 11, O.—Complete line of solenoid pilot-operated control valves meet or exceed JIC standards and are capable of controlling over 600 cycles per minute. Single and double solenoid types, for foot, sub-base or manifold mounting in ¼, ⅜, ½ and 1 in. pipe sizes, are available. Pressure ranges are 35-200 psi air and 35-125 psi hydraulic oil for both single and double solenoid valves with internal pilot supply; 0-250 psi air, hydraulic oil and water for both single and double solenoid valves with external pilot supply and 50-125 psi water for single and double solenoid valves with internal pilot supply.

For More Details Circle No. 429—Page 245

Car Puller

uses two cable drums powered by an electric motor

Hewitt-Robins Inc., Jones Machinery Division, Stamford, Conn.—Car puller can move and spot freight cars on railroad sidings. Puller consists of two cable drums driven by an electric motor through a triple reduction herringbone gear reducer and a reversing mechanism. One end of a

SPO holo-core MACHINES

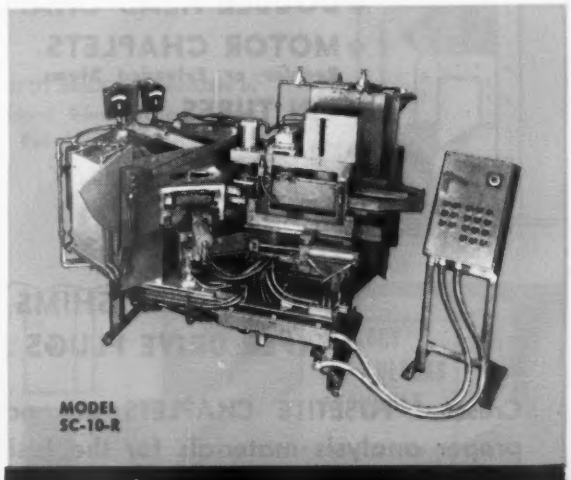
A NEW CONCEPT in casting quality and economy has developed because of *hollow cores.* Outstandingly superior to conventional cores, hollow cores assure extremely close tolerances . . . require no secondary operations . . . can be mass produced quickly and economically. They also eliminate venting problems, permit faster shake-out, are easier to handle.

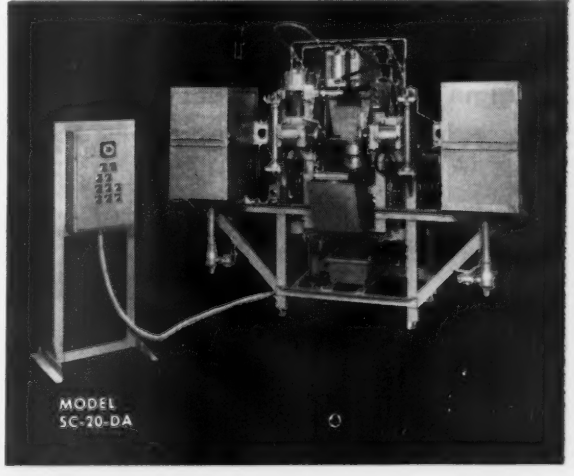
TO MEET THE NEED for dependable hollow core equipment, SPO has developed a new line of "Holo-Core" machines. Three models are available. MODEL SC-10-D accommodates two core boxes up to 10x10x6". MODEL SC-20-D handles two boxes measuring 20x16x10". Operated by one man, these 2-station machines can be equipped with manual or semi-automatic controls. MODEL SC-10-R, a six-station rotary-type machine, features automatic control of all operations except finished core removal. *Its complete cycle is 15 seconds or less!*

For details and specifications, write for Bulletin SC-100 . . . or call DIamond 1-3666.

SPO INCORPORATED

6449 Grand Division Avenue • Cleveland 25, Ohio


MODEL SC-10-R


MODEL SC-20-DA

Crescent Chaplets

FUSE-TITE

While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.

A FEW OF OUR SPECIALTIES

- RADIATOR CHAPLETS
- SHOULDER CHAPLETS
- BOILER CHAPLETS
- DOUBLE HEAD CHAPLETS
- MOTOR CHAPLETS
  Regular or Extended Stems
- TIN TUBES
- CHAPLET NAILS
  Plain, Nickeled or Barbed
- SKIM GATES
- CORE WIRES
- CORE TINS & SHIMS
- TAPER DRIVE PLUGS

Crescent FUSETITE CHAPLETS are accurately made of proper analysis materials for the fusing-in process. We have been devising and supplying chaplets since 1889, and our stocks are amazingly ample and varied. We originated Radiator, Shoulder, Double Head and Motor Chaplets, and if necessary, we can originate Special Chaplets for YOU.

WRITE FOR SAMPLES AND PRICE LIST

★

CRESCENT BRASS & PIN CO.
5766 TRUMBULL AVE. DETROIT 8, MICHIGAN

Circle 724 on Inquiry Card—Page 245

flexible wire rope is fastened to one of the dual drums. Other end of the cable is fastened to a second drum. At midway points in the cable along each track are "bull" rings to which short lengths of cable carrying car hooks are attached. To move a car, or cars, a hook is slipped over a car sill or through the car coupling and the puller is operated in forward or reverse by pushbuttons to move the car in either direction.

For More Details Circle No. 430—Page 245

Spindle Sander

uses small diameter spindles as an aid to faster production

Boice-Crane Co., Toledo, O.—Oscillating spindle sander-grinder uses ¼, ⅜, ½ and ¾-in. diam spindles. With these small diameter spindles

any kind of scroll or grill work or small radius contours can be machine finished easily and quickly. Arbors or drums carrying the abrasive sleeves have taper shanks which install quickly onto a taper-socket main spindle. Another advantage claimed is that the drums for abrasives over ¾-in. in diam may remain permanently on the spindles.

For More Details Circle No. 431—Page 245

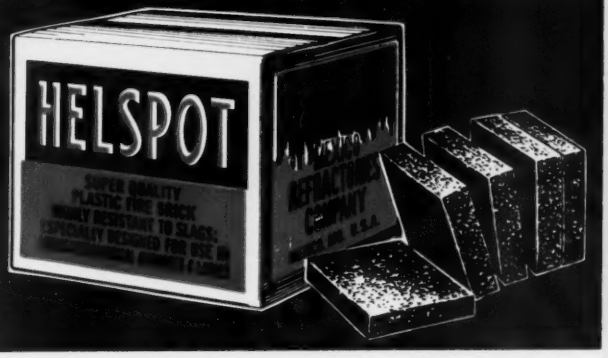
Gas-Oil Burners

for industrial applications have wide capacity ranges

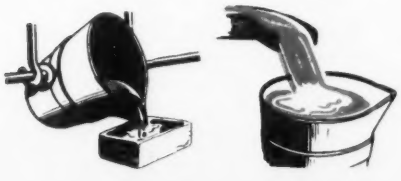
Iron Fireman Mfg. Co., 3170 West 106th St., Cleveland 11, O.—Combination gas-oil burners are for industrial applications. Oil burner fires with No. 6 or lighter oil and consumes from 9 to 125 gallons per hour. Ring type gas burner has multiple tubular stainless steel jets threaded into a heat-resistant cast iron manifold ring and can be used with either natural or manufactured gas. Capacities range from 1,650,000 to 1,750,000 Btu input per hour. Changeover from

HELSPOT

PLASTIC For Repairs

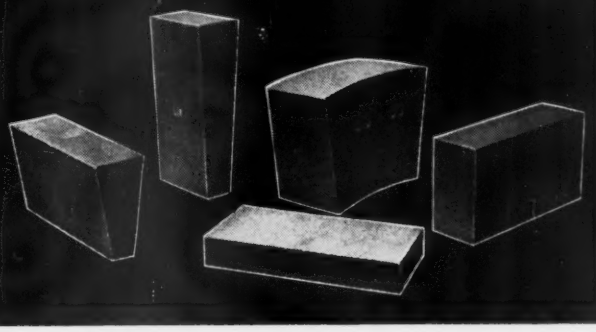


For fast, safe and economical repairing of the fire clay lining in the cupola-well, HELSPOT plastic may be easily installed over the spalled and eroded surface; simply ram HELSPOT in the "dished-out" area. It is easy to handle and install. Its "lubricating" qualities minimize the formation of slag and promote free flowing of the metal. Test HELSPOT by using it on your next repair job . . . let it prove its performance.
HELSPOT plastic is packed in 100-lb. waterproof cartons. It is conveniently sliced for ease of handling.



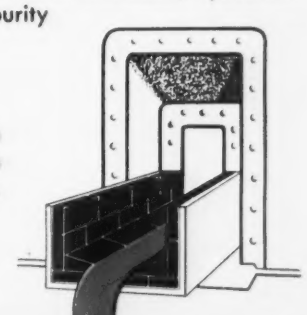
For quick repairs of ladle-linings, runners and spouts, rely on HELSPOT plastic.

BRICK For Linings



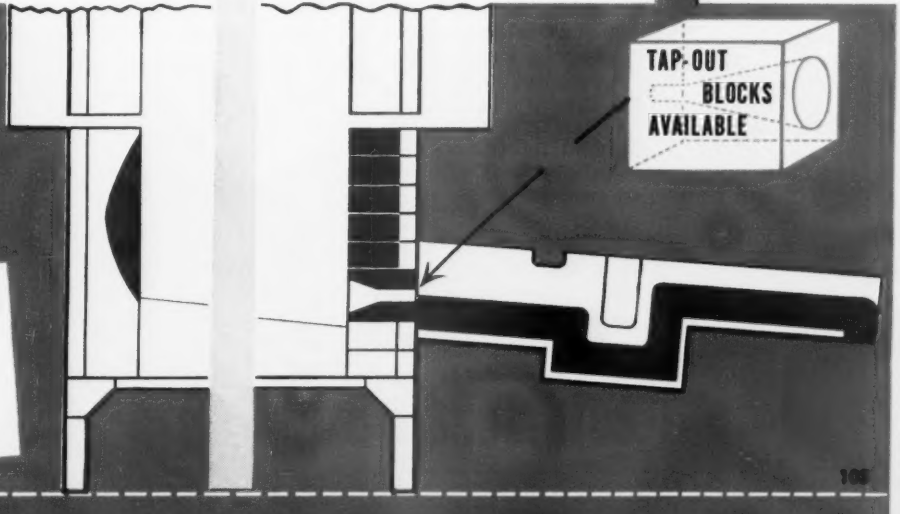
HELSPOT brick, with a graphite base and high refractoriness are ideal for lining the cupola-well below the tuyeres. In many installations they are credited with giving many times the life obtained from brick and clay combinations. Maintenance problems are reduced, doors drop more freely; a marked saving in labor drudgery is noted. Production is increased, operation is more economical and purity of metal is increased.

HELSPOT BRICK are available in standard 9-inch series shapes and 9x6x4 cupola block sizes.



Warehouse stocks and distributors in principal industrial areas. See the classified section of your telephone directory for the distributor nearest you.

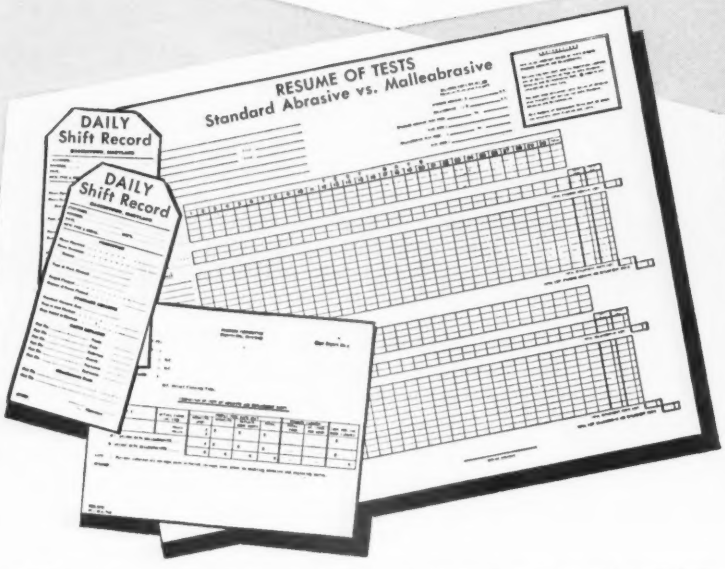
ENGINEERING ASSISTANCE by Our Specialists is Available . . .
Write or Call us . . .
No Obligation.



MEXICO REFRACTORIES COMPANY
MEXICO, MISSOURI
NILES FIRE BRICK DIV.—Niles, Ohio • NATIONAL REFRACTORIES DIV.—Philadelphia, Pa. • BIG SAVAGE REFRACTORIES DIV.—Frostburg, Md.
Canadian Affiliate: REFRACTORIES ENGINEERING & SUPPLIES, LTD.—Hamilton, Ontario, Canada

MALLEABRASIVE®

—PUT THE "test" IN testing!



The only real test of any abrasive is its cost per ton of castings —obtained only by completely recorded use in production.

Malleabrasive was the first metal abrasive to be sold on the basis of recorded production performance in user's plants. The fact is, in its early stages of limited production, we sold it **only** to those who would agree to run recorded comparative tests. Yes, Malleabrasive really "put the test in testing" — really started all of this testing business!

Malleabrasive's economy has since been proven in hundreds of plants, so there are no restrictions on its sale any more. But—we do say, if extravagant claims and gimmick-guarantees are offered you that some other abrasives are cheaper for you than Malleabrasive, the only way to get the facts is to run recorded tests of both materials. Don't depend on generalities.

Samples of the test record forms used to establish Malleabrasive's economy will be sent on request. Write us.

THE GLOBE
STEEL ABRASIVE COMPANY
MANSFIELD, OHIO

Sold and recommended by
Pangborn Corp., Hagerstown, Md.

"NOW IN EASY TO HANDLE
50-POUND DOUBLE BURLAP BAGS"

Circle 726 on Inquiry Card—Page 245

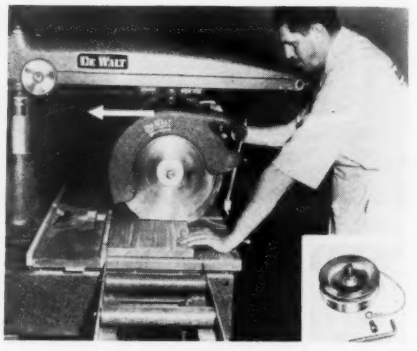
one fuel to another is done by selector switch or by automatic controls. Combustion controls shut down the burner in case some abnormal condition rises.

For More Details Circle No. 432—Page 245

Carriage Return

is for application on radial arm woodworking machines

DeWalt Inc., subsidiary of American Machine & Foundry Co., Lancaster, Pa.—Safety device automatically returns the motor carriage and cutting member of radial arm woodworking machines when the operator relaxes his forward pull on the carriage. The device is a self-contained unit, designed for quick mounting, using existing drilled and tapped holes in the motor carriage and radial arm of the company's model GE machines. When properly installed the unit offers little if any resistance to the forward pull of the motor carriage. It employs a special spring arrangement and cable-retrieving reel to permit a long cable payout without excessive force build-up.



For More Details Circle No. 433—Page 245

Salamander

uses either natural, manufactured or LP gas for local heat

Summit Products Co., Uniontown, Pa.—Gas-fired salamander for heating localized areas uses natural gas, manufactured gas or liquid petroleum gas. It is equipped with an on-off valve, circular gas burner, heat deflector and legs. The heat deflector and the combustion chamber are made of stainless steel. With natural gas at 5 oz pressure, the unit will radiate 125,000 Btu per hour.

For More Details Circle No. 434—Page 245

Barrel Truck

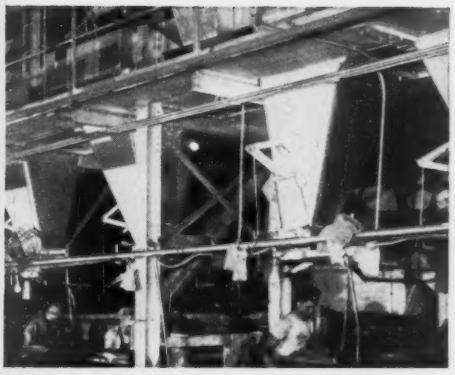
of aluminum has safety brakes that control loads to 1000 lb

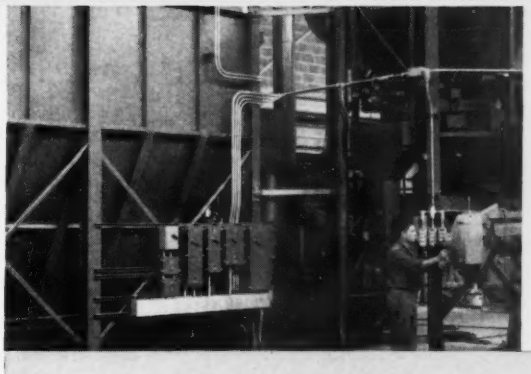
Valley Craft Products Inc., 750 Jefferson, Lake City, Minn.—Aluminum barrel truck is equipped with two-

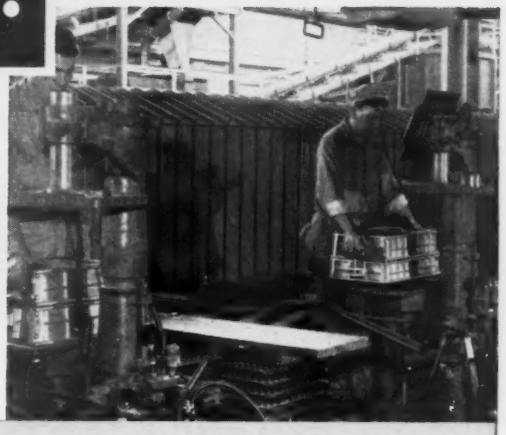
A partial list of Knight clients

Acindar
Buenos Aires, Arg.
Acinfer
Villa Constitucion, Arg.
American Radiator & Standard Sanitary Corp.
Baltimore and Louisville
Appleton Electric Company
South Milwaukee, Wis.
B.I.F. Industries, Inc.
Providence, R. I.
Buckeye Steel Foundry Co.
Columbus, O.
Canadian Car and Foundry Company, Ltd.
Montreal, Quebec
Chrysler Corp.
New Orleans, La.
James B. Clow & Sons Co.
Birmingham, Ala.
Combustion Engineering Inc
Chattanooga, Tenn.
Crane Company
Chicago, Ill.
Dalton Foundries, Inc.
Warsaw, Indiana
Electric Steel Foundry Company
Portland, Ore.
Erie Malleable Iron Company
Erie, Pa.
Fahralloy Limited
Orillia, Ont.
Fairbanks, Morse & Company
Kansas City, Kan.
Ft. Pitt Steel Castings Division
McKeesport, Pa.
Hammond Brass Works
Hammond, Ind.
Haynes Stellite Company
Kokomo, Ind.
Macfarlane
Sagua la Grande, Cuba
Moline Malleable Iron Company
St. Charles, Ill.
National Roll & Steel Foundry
Avonmore, Pa.
Pittsburg Steel Foundry Corporation
Glassport, Pa.
Sulzer Bros. Ltd.
Winterthur, Switzerland
Unitcast Corporation, Ltd.
Sherbrooke, Quebec
Universal Castings Corporation
Chicago, Ill.
Wagner Malleable Iron Company
Decatur, Ill.
Woodruff & Edwards, Inc.
Elgin, Ill.
Worthington Corporation
Harrison, N. J.

HUNDREDS OF FOUNDRIES CALL ON EXPERIENCED KNIGHT ENGINEERS FOR PRACTICAL, RELIABLE ASSISTANCE...







...ON VIRTUALLY ALL FOUNDRY PROBLEMS!

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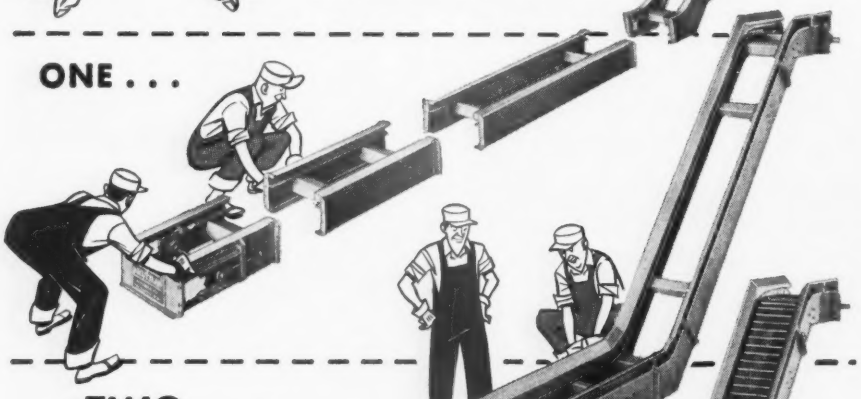

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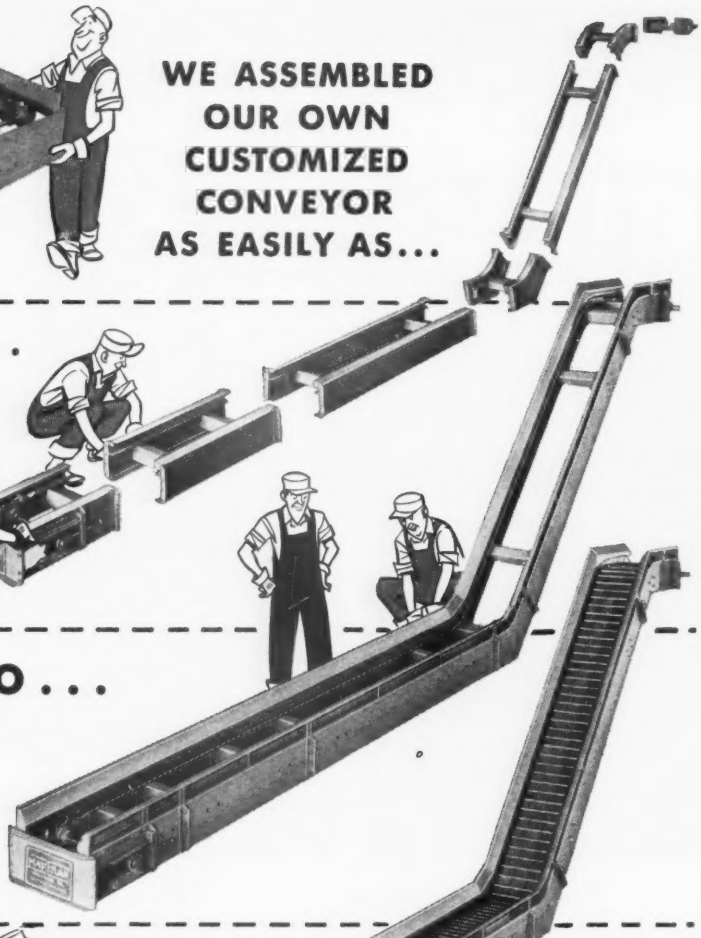

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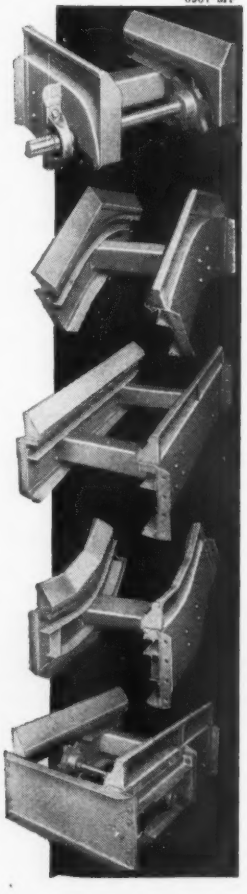

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wheel safety brakes claimed to give the operator complete control of loads as heavy as 1000 lb when moving down ramps or steep inclines. Ball bearing wheels may be equipped with solid rubber or pneumatic tires.

A spring actuated chime hook speeds barrel handling. Easy tipping of heavy barrels, it is claimed, is made possible by loading shoes designed to permit use of comparatively short handles. These shorter handles provide easier turning in confined areas.

For More Details Circle No. 435—Page 245

Rotary Air Grinder

is lightweight but adaptable to production grinding jobs

Thor Power Tool Co., Aurora, Ill.—Lightweight rotary air grinder reportedly produces 23 per cent more power than former models, operates at 20,000 rpm and weighs 2 lb. Number of working parts has been reduced to increase life of tool and reduce maintenance costs. Designed primarily for precision die work, the grinder is adaptable to production grinding operations in shops and laboratories and to bench duties. Overall length is 11½ in. It operates on air pressure of 90 lb and has a ¼-in. air inlet pipe thread and takes a ⅜-in. minimum hose size. Bonded wheels up to 1¾ in. can be handled.

For More Details Circle No. 436—Page 245

Sealing Nut

is said to assure perfect sealing of pipe thread elements

Tru-Seal Division, Flick-Reedy Corp., 2040 North Hawthorne Ave., Melrose Park, Ill.—Pipe thread seal fitting is a standard nut with half its threaded area composed of a flexible sealing medium. It is designed to seal pipe line connections for oil, water, air, gas, steam, vacuum and chemicals except fluorine or molten alkaline metals. It is said to perform satisfactorily for pressures to 3000 psi and temperatures from —280 to 500°F.

For More Details Circle No. 437—Page 245

These two 300 pound TOCCO melting furnaces are powered by a 200 KW, 3000 cycle TOCCO motor generator set.

TOCCO* Induction Melting "Delivers"— In Two Days Instead of Two Months!

Casting backlogs at Commercial Shearing and Stamping Co. in Youngstown, Ohio used to lag from 8 to 10 weeks behind production schedules. By installing four 300 pound TOCCO melting furnaces this firm upped daily melting capacity to 16,000 pounds. Now orders can be shipped in 48 to 72 hours.

In a foundry occupying less than 5000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push-button basis, many former drilling and roughing operations were completely eliminated.

Many firms have discovered that TOCCO Induction Melting insures maximum quality control, increased volume and lower operating costs—foundry premiums directly linked to TOCCO's rapid melting, simplicity of operation, low alloy loss, constant burn off and pinpoint quality control.

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Technical Discussions at

BRITISH FOUNDRY CONVENTION

By VINCENT DELPORT
European Manager

BOTH ferrous and nonferrous subjects were treated in the technical papers presented at the 53rd annual convention of the Institute of British Foundrymen held June 12-15 at Cardiff, Wales. A brief summary of the papers follows:

Recent Developments and Current Trends of British Shell-Molding Practice, by D. F. Bailey, Bakelite Ltd. The application of shell techniques to coremaking is an important current trend. A method of blowing shell molds appears promising for cheapening production and material costs. A sand-resin mixture is blown into the cavity between a hot pattern and a contoured blowing plate; this eliminates the dump bucket. Low resin content can be used as the shell does not have to hang from an inverted pattern, and the thickness and outside shape can be as desired.

The importance of a good runner system for shell-molded castings is better appreciated than it was, and the requirements and current techniques, including differing pouring setups, were discussed. Assembly methods tend largely toward the use of adhesives. The current position of backing shell molds is outlined, with particular reference to increased cooling rates obtained with backed shells.

Internal Stress in Castings was the second report of subcommittee T.S. 32 of the Technical Council. Chairman of the committee is M. M. Hallett. After reviewing earlier work, the report describes experiments on casting small triangular gray iron grids in warm molds, with consequent reduction in residual stress. Similar grids of larger size were cast with a series of varying sectional thicknesses in the center limb of the grid, and showed tensile internal stresses in the heavier sections. The greater the difference in sectional thickness existing within the casting, the higher was the stress.

Stress distribution also was determined in a number of disks in varying thicknesses in mild steel, austenitic steel and cast iron. In all cases, the magnitude of the internal stresses depended mainly on the magnitude of the temperature differences existing within the cooling casting. To avoid internal stresses, by far the most effective method is to reduce temperature differences in the casting during cooling in the mold. This can be done by padding or thickening of light sections and the thinning of heavy sections. Often the most practical solution is to run the castings through the thinnest sections, thereby heating the surrounding sand and retarding the cooling of the thin section.

Application of Insulated Feeders to Sand Castings in Long Freezing Range Copper Alloys, by R. S. Jackson, Deloro Stellite Ltd. Insulating or exothermic sleeves are unlikely to be advantageous with most small or light-section castings, but their use may well be economical with large castings where the use of feeders is essential to prevent shrinkage defects. The work has also thrown much light on the mechanism of feeding in copper alloys having a long freezing range.

Influence of Rate of Solidification on the Mechanical Properties of Cu-Sn-Zn and Cu-Sn-P Alloys was the exchange paper of the Association Technique de Fonderie (Paris), by P. J. Le Thomas and D. Arnaud. Factors determining the mechanical properties of any given point in a tin-bronze casting are the amount of the delta-constituent present and the grain size at this point. A relationship exists between grain size and percentage of delta-phase, for a given tin content, but this is valid only for known depth from the surface of the casting. Since all these variables are related, a necessary correlation exists between the strength properties of sectioned specimens removed from any castings in the same bronze. This analysis assumes, of course, that the castings are free

DISPLAYS REDUCE SCRAP: Scrap loss has been reduced at Pangborn Corp., Hagerstown, Md., by two simple, graphic displays developed by Frank Kaiss, general superintendent. These displays consist of panels on which are mounted specimens of sheet, plate, bar stock and angle iron with the cost marked on each piece. Costs shown are f.o.b. Hagerstown without processing costs. Costs are changed periodically to reflect changes in mill prices, and displays frequently are moved to different locations

total time . . . six minutes

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Circle 731 on Inquiry Card—Page 245

from defects and that the tensile test is indicative of the strength of the actual crystals, not that of the boundaries.

Fundamental Considerations for Cupola Operations was the exchange paper of the American Foundrymen's Society, by W. R. Jaeschke, Whiting Corp., Harvey, Ill. An early study of combustion in the cupola is made and factors of cupola operation that affect combustion and melting conditions are discussed. Emphasis is placed on the importance of coke quality, material size, stock distribution, and 'hang-ups.' These important factors are most frequently neglected. The author considers briefly some accessory equipment that will aid operators to secure greater uniformity, when even the best materials available and the best operating practice do not produce results that meet customer requirements with the equipment available.

Another paper on cupola operation, was by K. G. Harris, Guest Keen Iron & Steel Co. Ltd., Dowlais. The object of this paper, entitled **Cupola Experiments,** was to develop a technique whereby the company's cupola plant could supply, economically and metallurgically, the varied needs of the foundry and to investigate the possibilities of five-day-a-week operation under controlled conditions. The variables examined included combustion conditions, optimum charge weights, charge distribution, lining erosion, behavior of refractories as lining materials, and water cooling. The experiments led to a considerable saving in melting cost per ton of metal produced, together with hotter and cleaner metal, increased melting rate and reduced lining erosion.

A data sheet was developed, enabling the cupola operator to cope with any reasonable changes in materials or conditions. Use of carbon and 70 per cent alumina bricks as cupola lining showed considerable promise, but this was offset somewhat by oxidation difficulties with the carbon lining and economic considerations with the high-alumina brick. A simple type of water cooling of the cupola gave promising results, and when used with carbon or 70 per cent Al_2O_3 lining should go a long way toward making five-day-week operation possible.

Shrinkage Defects in Gray Iron Castings, by I. C. H. Hughes, Briitsh Cast Iron Research Association, and J. H. Gittus, Mond Nickel Co. Ltd. Conclusions are: a) Soundness is affected by the composition of the iron in a way which is by no means clearly established. b) Inoculation, melting in contact with coke, and coarse graphite structures are associated

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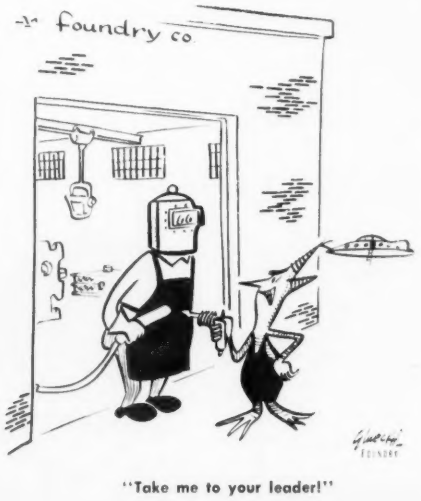
with a decrease in soundness regardless of composition. Conversely superheating and graphite refining treatments increase casting soundness. c) Design of castings has an important effect upon soundness. d) Increasing the pouring temperature of K-bar castings increases the internal porosity and decreases surface shrinkage. e) Although it has received no attention in the paper, mold rigidity affects soundness of the casting.

A contribution from the British Non-Ferrous Metals Research Association, by R. Jay, now with British Aluminium Co. Ltd. and A. Cibula, of the association, was on **Influence of Magnesium Content on Layer Porosity and Tensile Properties of Sand-Cast Al-Mg-Alloys, B.S.1490-LMLO and B.S.(Aircraft)L.53.** Tests indicated that in D.T.D. bars containing 10.8 to 12 per cent Mg and poured from degassed melts, microporosity was uniformly distributed and the maximum tensile properties were obtained. Bars with more than 12 per cent Mg contained undissolved beta-phase and were brittle; in bars having less than 10.8 per cent Mg, layers of microporosity occurred which seriously reduced the tensile strength. Lack of feeding and, to a lesser extent, gas intensified layer porosity whatever the magnesium content. The properties of larger bars were low and much less influenced by their magnesium content.

Solubility of Hydrogen in Iron-Carbon-Silicon Alloys, by V. B. John, formerly at University College, Cardiff, now with the Royal Air Force, and T. Evans, University College, Cardiff. The investigations described form the second part of a research program on the equilibrium solubility of hydrogen in pure iron and ferrous alloys. The solubility of hydrogen, at a pressure of one atmosphere, in alloys of iron and carbon, iron and



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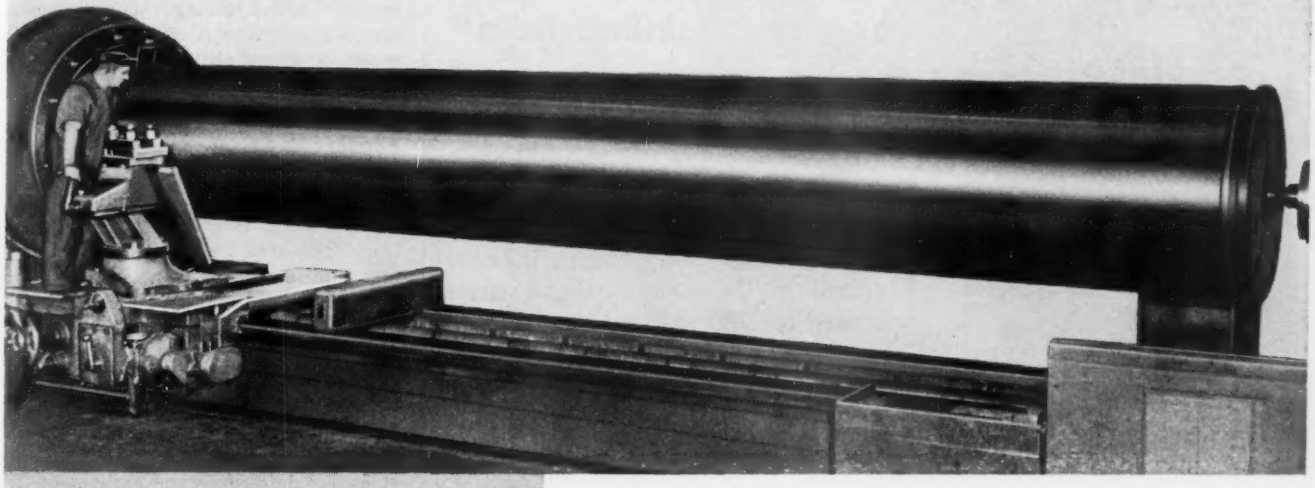
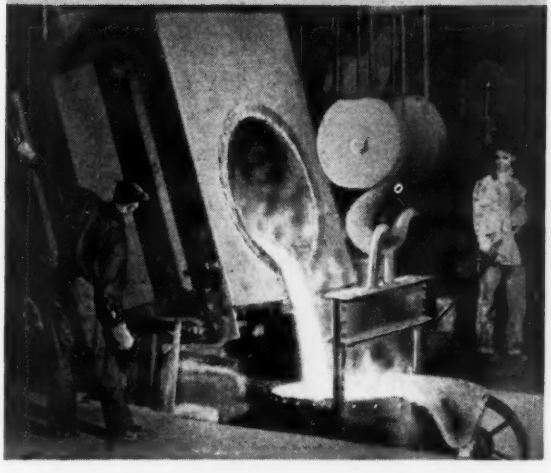


. . . cast by SANDUSKY . . . melted in AJAX Furnaces



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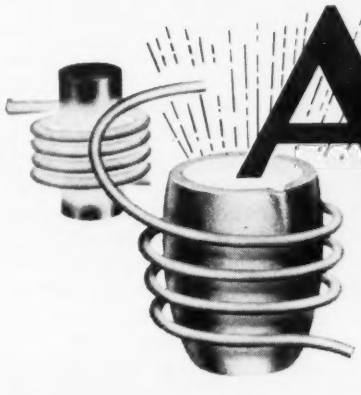
Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



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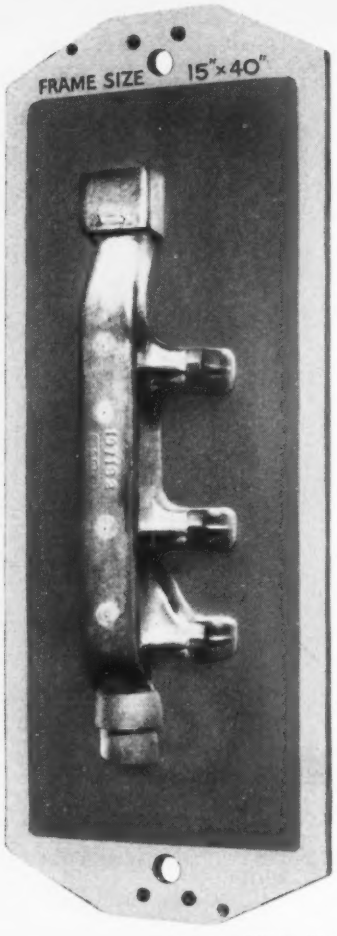

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For Better Melting

Circle 736 on Inquiry Card—Page 245

silicon, and iron, carbon and silicon, has been determined over the temperature range of 600 to 1000° C. It was found that silicon caused a decrease in the solubility of hydrogen in both iron and in alloys of iron and carbon. Graphite was formed in the ternary alloys during the heat treatments given, and it appeared that the presence of graphite increased slightly the hydrogen solubility.

Development and Application of a Foundry Test for Assessing Shrinkage Behavior in Gray Cast Iron, by J. Grice, Tangyes Ltd., Birmingham and Dr. J. T. Berry, Naval Construction Research Establishment Dunfermline, Scotland. Experiments were carried out to record temperature gradients during solidification and corresponding shrinkage defects. It was concluded that for the particular alloy used: a) Chvorinov's rule is only partially successful, under-feeder shrinkage persisting. b) The criterion of Pellini regarding temperature plateaus is not entirely applicable. c) Although feeding in the latter stages of solidification appears to take place, the persistent underfeeder shrinkage probably depends much on the absence of 'mass-feeding'.

A report from subcommittee T.S.44 of the Technical Council of the Institute, with S. J. Sargood as chairman was presented on **Receivers, Tapping Systems and Slag Disposal.** The high initial and operating costs of electric furnaces may only be justified where close composition or temperature control or exceptionally high temperatures are required. Conversely, if an electric furnace and a cupola are both required, it may be possible for the electric furnace to act also as a receiver for the cupola metal. With the temperature control attainable in an electric furnace used as a receiver, the furnace capacity may be as large as required, subject to costs; in addition, iron unsuitable for pouring may be returned to the furnace to avoid pigging. Induction furnaces are particularly suitable where close control of composition is required.

F. M. Shaw, British Cast Iron Research Association, contributed a paper on **Emission from Cupolas** in which he mentioned the lack of efficiency of the expansion and baffle type of dust collector, and the high cost of equipment giving from 70 to 90 per cent efficiency. The simple baffle and water spray type collector will remove about half of the dust in the gases, and offers the cheapest means of achieving a reasonable degree of cleaning. The particles escaping this type of collector are fairly small and unlikely to constitute a nuisance. Smoke from dirty scrap, etc., consisting of very small

particles, is very difficult to remove, but may be minimized by insuring complete burning of stack gases.

Internal Chills in Molds for Steel Castings by G. W. Miles, Edgar Allen & Co. Ltd., Sheffield, discussed the extent to which different sized inserts and chaplets fuse into the casting. Apparently there is an optimum size of chill relative to the size of casting if fusion with the casting is to occur and cracks or blowholes be avoided. Further, chaplets should be chosen both as regards the number and the size used, so that they just support the load placed upon them, when surrounded by molten steel; also, the fewer the number used, the fewer the possibilities of introducing defects. In general, unless great care is taken in the selection of internal chills, casting defects are likely to be introduced. If such attention is not devoted to the subject, other means of providing progressive solidification and feeding must be employed.

The British Steel Castings Research Association contributed a paper on **Basic Principles Applicable to Steelmaking in Founding Practice** by T. A. Cosh and Dr. R. J. Sarjant of the Association. Existing knowledge of the physical chemistry of steelmaking is not as widely applied in a practical sense as it might be. It involves a fairly deep acquaintance with fundamental mathematical and physical principles. Further, the problems associated with everyday practice in the melting shop do not lend themselves readily to the precision of measurement required by this branch of science. The laws of physical chemistry have an extremely important bearing on steelmaking practice. So the object of the paper is to pick out the more important features of special interest which emerge from classical research in the field.

Book Review

ASTM Standards, 1955, *Part 4, Paint, Naval Stores, Wood, Cellulose, Wax Polishes, Sandwich and Building Constructions, Fire Tests*, cloth, 1383 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $11.

Contains over 325 formally adopted standards, tentative specifications, methods of test and definitions relating to the various materials mentioned in the title. The book is divided into ten subdivisions including paint, varnish and related products including naval stores; cellulose and cellulose derivatives; wax polishes; wood and wood preservatives; acoustical materials; structural sandwich materials; methods of testing building construction; fire tests; thermometers, and general testing methods.

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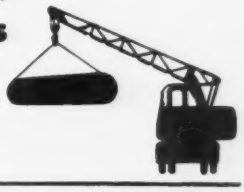

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Circle 737 on Inquiry Card—Page 245

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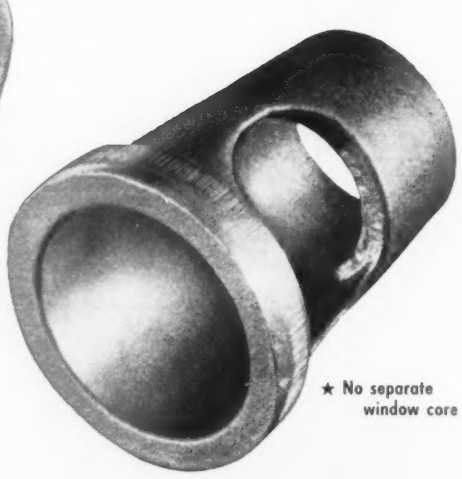

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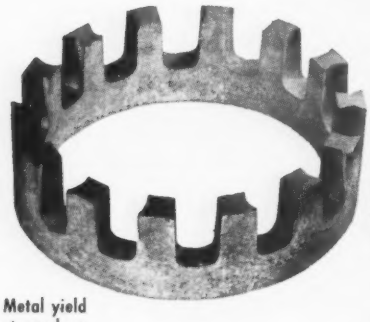

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Circle 738 on Inquiry Card—Page 245

Radiation Injury to Eyes No Danger during Pouring

Arc Welding Is Greater Source of Eye Damage

By Dr. W. Schweisheimer

EFFECTS of radiation from hot metal during foundry pouring were discussed recently in the *Journal* of the American Medical Association. The discussion considered effects over a period of years and whether a time limit should be placed on workers on such jobs.

It was stated that the heat from pouring hot iron or any other metal in a foundry has no effect on eyes, even over a period of years. In a recent court case, amounts of infrared and ultraviolet light in a foundry were measured and were found to be so small and of such short duration that no pathological effect could be attributed to them.

The discussion mentioned that the only clear-cut pathological effect on human beings ever recorded in a related situation is the occurrence of glass blower's cataract in Europe. Such injuries never have been reported in America, and in Europe they implied long, constant exposure daily for as much as 18 or 20 years. According to the opinion of the writer in the *Journal,* no comparable operation exists in America, and no risk is taken by an employee working with hot metal in a foundry.

Radiation and Eyes—Eyes of modern industrial workers must be protected from various types of radiation. Longer infrared rays tend to be absorbed and to raise tissue temperatures; shorter waves, beginning with ultraviolet rays, may destroy tissues. From the earliest days of the use of arc welding—first introduced about 1879—dense glasses have been used to protect operators from the extreme brilliance of the arc.

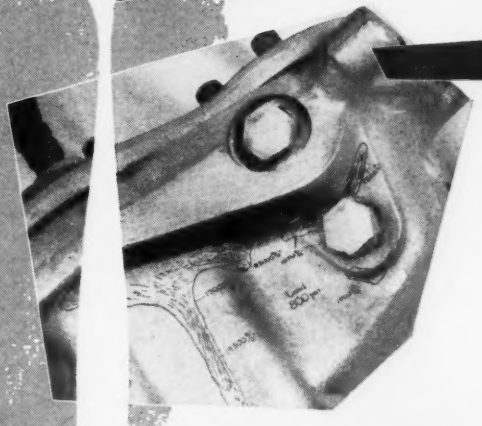
Widemark showed that "flash" is caused by shorter ultraviolet rays, and Verhoeff and Bell found the quantitative basis for their effect. Today, wave length is measured by the angstrom unit. Ultraviolet rays, for example, have a wave length of 5 angstroms—that is, 0.00000005 mm.

In recent months, the question of protection from infrared rays has received special attention. R. G. Giovanelli, an Australian engineer, states that all injuries ascribed to infrared radiation so far have occurred not to welders, but to people associated with furnaces. Infrared

Three Steps to Better Castings and Increased Profits

specify 1.

Settling certain points with your customer at the outset insures your profit and his satisfaction upon delivery of the completed order. First determine the service requirements of the casting and characteristics desired. Establish a standard which satisfies the needs at a reasonable cost. Find out if the design is satisfactory functionally, structurally and *foundry-wise.*



design 2.

Good design insures trouble-free foundry practice, profitable operation and customer satisfaction. Castings with even stress flow are more serviceable and easier to pour. Experimental stress analysis with M Stresscoat brittle lacquer enables your engineers to make design changes without guesswork or wasted effort. Design for service, easy casting, and high profits.

inspect 3.

M Magnaglo (M Zyglo for non-ferrous) is recommended as a "finger on the pulse" means of determining the causes of cracking in the foundry. Simple tests immediately after shakeout or cleaning can locate cracking when it first occurs and enable you to take corrective steps no matter what the cause. With sampling inspection you can actually control the quality of the entire run as it is being poured. You do not waste time and profits handling, heat treating, finishing, etc., intermittent lots of cracked castings. It all adds up to better products for the customers and higher profits for the foundry!

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Circle 739 on Inquiry Card—Page 245

rays are generated by heated bodies like slabs of metal or glass and have a length of some 7800 angstroms.

A committee of the British Standards Institution investigating the dangers of infrared radiation in welding found no case of eye damage in welders which could be ascribed to infrared rays. Either the measures taken for protection were adequate, or infrared is not emitted in sufficient amounts to cause trouble.

Welders' Flash—A survey of 47 cases of electric ophthalmia (flash burn of the eyes) was made by Lewis K. Woodward Jr., who stated that goggles and hoods give adequate protection against this type of accident. The chief complaint in cases of eye flash caused by arc welding is a burning sensation or pain in one or both eyes, frequently accompanied by a feeling that a foreign body, like sand, is in the eye. The eyes shed tears and close against the light, and the lids are tightly closed and sometimes swollen. The conjunctiva is reddened. With proper care, all symptoms disappear within 24 hours in most cases—almost certainly within 48 hours after the exposure.

Eyes are protected from infrared rays by ferric oxide lenses, which filter out most harmful radiations. Charles F. Kutscher mentions that the level of illumination in a plant may be raised to offset the disadvantage of dark glasses. Mr. Kutscher points out that among glass blowers, puddlers, tin plate workers, rollers or others who encounter extensive hot surfaces, characteristic opacities develop in the lens of the eye. A cataract forms only after long periods of daily exposure. On the average, workers are unable to perform their jobs after 27 years of such exposure.

Mr. Giovanelli also considers heat rays the cause of cataract as a result of a slight temperature rise in the lens. Cataracts were reported among tin plate millmen who roll out red-hot steel. Of the men he saw who were over 50 years old, 65 per cent had cataracts. Other industrial operations in which occurrence of cataracts has been reported are iron melting and chain making. In these operations, most of the radiation is in the infrared region of the spectrum. Cataract is very gradual in its development. Effects of eye flash, on the other hand, are so painful that they demand attention and care at once.

Workmen Nearby Are in Danger

Writing in the *Medical Bulletin* of the U. S. Navy, Clifton E. Benson reported an exposure of eyes to the radiant energy of a welding arc. It is not the welder, he said, who is the most frequent victim of his own arc. It is the workmen busy near him. The welder protects himself with a hood. He may, however, receive a flash injury from another welder's arc or from his own if it is struck accidentally while his hood is raised. Minimum safe distance from a welder's arc without the protection of goggles is estimated at 200 ft.

After eyes have been exposed to an arc, a latent period ensues which may range from 2 to 15 hours. The lesion then manifests itself with a sudden onset of dread of light, the production of tears and a burning sensation in the eyes. Mr. Benson's treatment includes medication, rest in a semidarkened room and application of cool, moist compresses. Dark glasses are furnished to be worn until all signs have disappeared. Of 871 cases treated at the Norfolk Navy Yard, only 18 required that sick leave be granted.

Repeated Exposure to Ultraviolet Rays — Mr. Benson believes that

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symptomatic treatment may return workers to their jobs with considerably fewer man-hours lost. The danger in an immediate return to work is the possibility of repeated exposure to ultraviolet rays within 24 hours. This danger can be prevented by keeping recovering employees away from the vicinity of welders or by furnishing protective goggles to them.

Eclipse Blindness — An additional type of damage possible in arc welding is eclipse blindness. Its occurrence is, however, completely eliminated when modern protective measures are used. This injury, in ancient times the result of looking directly at the sun, is caused by a temperature rise in the retina. In serious cases it destroys that part of the retina upon which the image of the sun has been fixed. At least two instances have been recorded when a thermal lesion of the retina was produced in an individual watching welding from about 6 ft away. The efficient protection against infrared rays provided by modern safety equipment undoubtedly has prevented other cases.

Offers Directory of Belgian Nonferrous Metal Industry

The Union of Non-Ferrous Metal Industries, Belgium, is publishing a directory of firms affiliated with the group. It contains 250 pages and is edited in five languages, including English. Chapters cover the following subjects: A survey of the Belgian nonferrous metal industry; composition of the board of directors and the by-laws of the group; classified directory of members and their products; alphabetical listing of member firms, with principal products, and a list of products.

Price of the directory is $2.50, excluding shipping costs (estimated at 50 cents). It can be ordered directly from the Union des Industries de Metaux Non-Ferreux, 7 Rue Joseph II, Brussels, Belgium.

Book Review

ASTM Standards on Light Metals and Alloys, Cast and Wrought, paper, 276 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $3.50.

Contains 49 standards, tentatives and methods of test relating to light metals and alloys. Included are ingots, castings, bars, rods, wire, forgings, pipe and tube, sheet and plate, wrought products for electrical purposes, filler metal, and electroplating.

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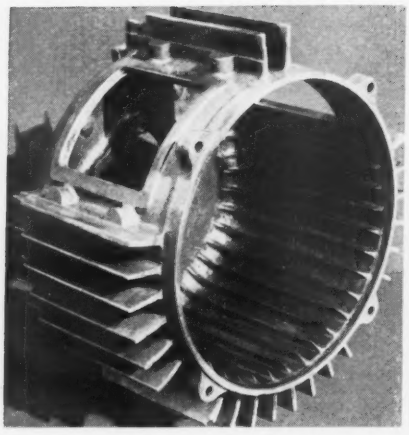


Fig. 2—End bell casting with window opening. Depth of casting is 9 in.

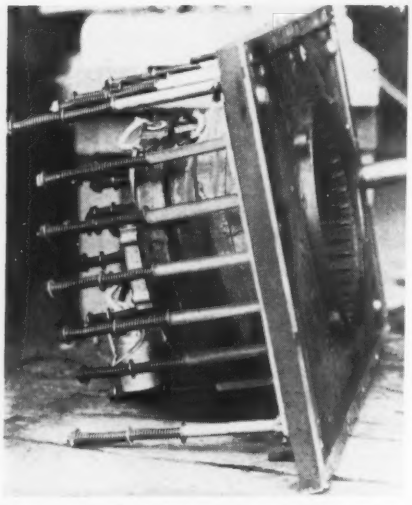


Fig. 3—End bell cope pattern plate. Depth requires long stripping pins

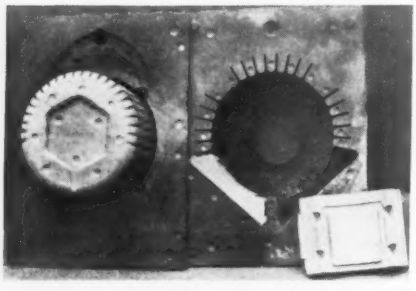


Fig. 4—View of the mold halves and cores used to make end bell casting

Fig. 5—Main body casting. In background are mold halves and the cores

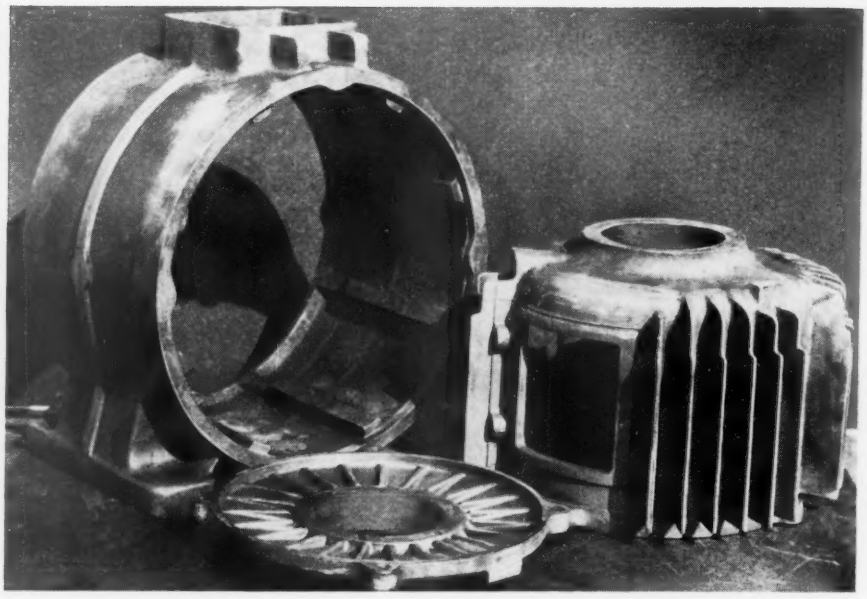


Fig. 1—Shell molded gray iron castings for electric motor. From left to right, they are the main body, bearing retainer and end bell castings

Electric Motor Parts

CAST IN SHELL MOLDS

By JOHN B. SHALLENBERGER
President
Shallway International Corp.
Palo Alto, Calif.

AN international patternmaking assignment recently undertaken by an American patternmaker has left a fine impression with foundrymen in France, and particularly with Compagnie Electro-Mecanique, Lyon, France.

This manufacturer of electric motors purchased a series of patterns and coreboxes from American Shell Molding Co., Los Angeles, for production of motor parts by the shell process. A 68-lb main body casting, a 45-lb finned end bell casting, and a 21-lb bearing retainer casting (Fig. 1) are produced at Electro-Mecanique with substantial savings in the cost of foundry operations. Large savings also have been made in subsequent machining, much of which has been eliminated by converting the job to shell molds and cores.

Long Stripping Pins Used—Molds are produced on a Shalco Model HO-5 shell molding machine, pattern size 18 x 24 in., and the cores on a Shalco Model MC-5 shell coreblower, using coreboxes up to 9 x 12 x 20 in. over-

Fig. 6—A half-section of the main body corebox and the foot corebox

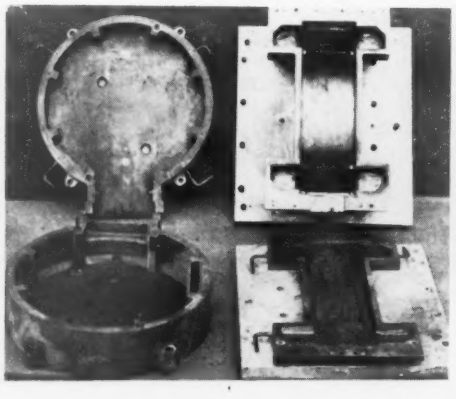
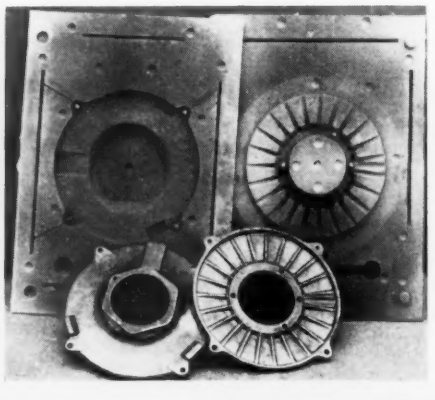


Fig. 7—Bearing retainer molds and castings. Note cast-in lug holes



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all. Because of the 9 in. depth of the end bell casting (Fig. 2), extra-long stripping pins are used on the pattern (Fig. 3). The draft is 0.039-in. over the 9-in. draw on the inside of the casting and 0.015-in. on each side of the external fins (Fig. 4).

Patterns for the main body casting are mounted above the plate line in both cope and drag halves. The main body core measures 10 in. through the parting line. It is produced in two pieces, which fit together to form a single core when set into the mold (Fig. 5).

The main body coreboxes have one shallow section in each half. To retain the core in the shallow side of the draw, four ¼-in.-diam pins are located on the shallow side (Fig. 6). When the pins are inserted and the box is closed and blown, the pins protrude ¼-in. into the core itself. After the curing cycle, these pins remain in position until the box is opened and they are drawn back to remove the core.

The bearing retainer molds (Fig. 7) are designed to cast in eight $\frac{7}{16}$-in. lug holes which formerly had to be drilled. The holes are 1¾-in. deep with 0.015-in. over-all draft. Ribs are formed near the outer edges of the mold for stiffening purposes. To assure sharp edges on the bosses, special vents are formed in the drag, leading into the stiffening rib cavities.

Brass Coreboxes and Patterns—All coreboxes and patterns are made of 85-5-5-5 brass with ⅝-in. wall sections to provide uniform heating. The patterns are mounted on 18 x 24-in. cast iron pattern plates, with both strip and cartridge heater elements to conform to inside and outside contours of the patterns. Each plate uses a maximum of 6500 w, thermostatically controlled to maintain constant heating of about 450° F over the pattern surface.

Best results are obtained by backing up the molds for pouring. The molds are laid in heap sand and are buried slightly under sand and a heavy weight.

A comparison of former costs of the castings with cost of the shell castings shows that foundry costs alone have been reduced at least 20 per cent. Machining and finishing costs have been reduced more than half.

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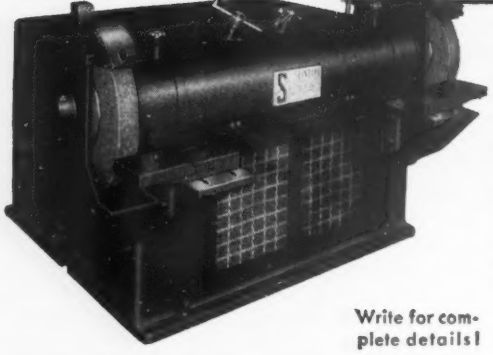

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Book Review

Basic Effects of Environment on the Strength, Scaling and Embrittlement of Metals at High Temperatures, paper, 120 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.75.

This publication consists of six papers with discussions presented at a symposium dealing with oxidation and surface effect on alloys at high temperature. The symposium was held at the 1955 spring meeting of the American Society for Testing Materials.

"Since we hired her—absenteeism has dropped 100 per cent."

Circle 743 on Inquiry Card—Page 245

What the Law Says About Overtime Pay for Foremen

Some Foremen Are Exempt, But Others Must Be Paid

By Robley D. Stevens

THE FAIR LABOR Standards Act states, in substance, that anyone covered by that law must be paid overtime for hours of work beyond 40 per week. The question is, who in a foundry is covered? What is the status of foremen?

These questions can be settled only by comparing the job functions of the individual to the simplified official "tests" of duties, responsibilities, salary and other requirements for eligibility. The language of these wage-hour "tests" is exclusionary—that is, anyone whose job measures up to all the requirements is *not* officially entitled to overtime; he is exempt from overtime pay.

Although no general conclusions can be drawn about the exemption status, the regulations provide that foremen and supervisors may be either exempt or not. Virtually all foremen are exempt from overtime pay when their positions meet all of the federal wage-hour "tests" prescribed.

Two classifications of foreman—"executive" and "administrative"—are exempted under Section 13(a) of the law. You can determine these classifications by applying the quick checklists below to each situation in question.

An executive foundry foreman is one who meets the following requirements:

1. His primary duty consists of the management of the enterprise in which he is employed or of a customarily recognized department or subdivision thereof.

2. He customarily and regularly directs the work of two or more other employees therein.

3. He has either the authority to hire or fire other employees, or his suggestions and recommendations as to the hiring or firing or any other change of status of other employees will be given particular weight.

4. He customarily and regularly exercises discretionary powers.

5. He does not devote more than 20 per cent of his hours worked in the work week to activities not closely and directly related to the performance of the work described in paragraphs (1) through (4) of this section, provided that this paragraph (5) shall not apply in the case of an employee who is in sole charge

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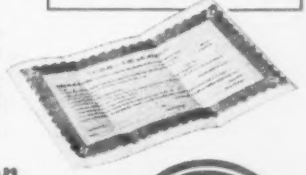

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Circle 744 on Inquiry Card—Page 245

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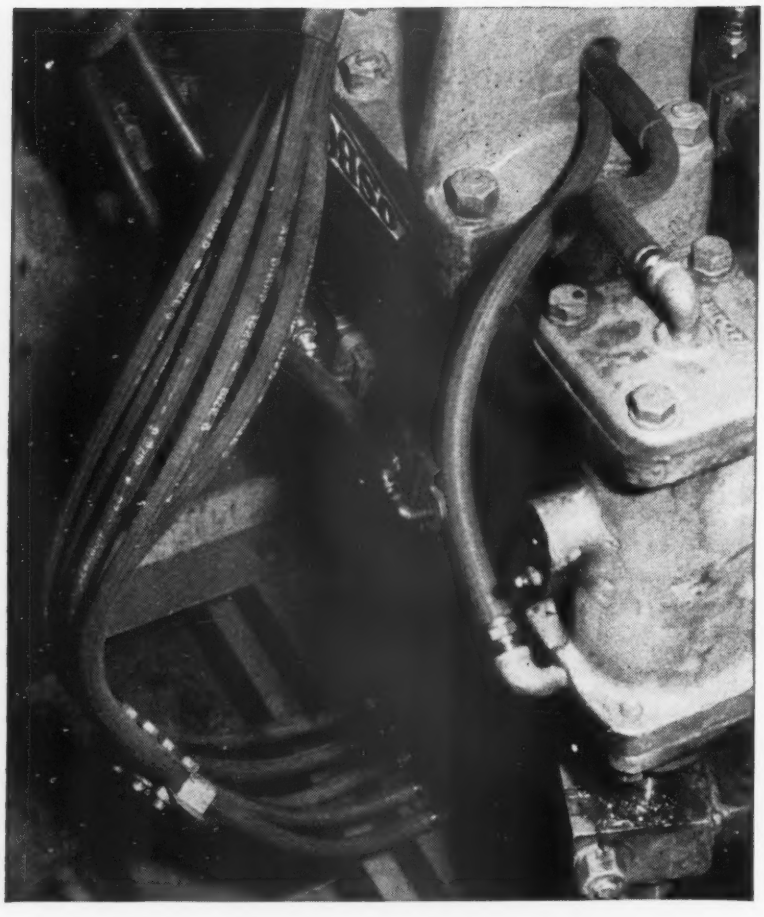

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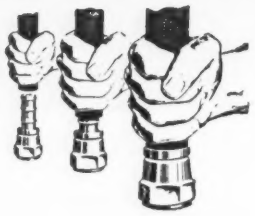

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Circle 745 on Inquiry Card—Page 245

of an independent establishment or a physically separated branch establishment or who owns at least 20 per cent interest in the firm in which he is employed.

6. He is compensated for his services on a salary basis at a rate of not less than $55 per week, exclusive of board, lodging or other facilities.

The "short test" below can be applied for quick reference in place of the one above:

An executive foreman is one who is compensated on a salary or fee basis at a rate of not less than $100 per week, exclusive of board, lodging or other facilities. His primary duty consists of the management of the enterprise in which he is employed or of a customarily recognized department or subdivision thereof and includes the customary and regular direction of two or more other employees.

Describes Administrative Foreman

An administrative foundry foreman must meet these requirements:

1. His primary duty consists of the performance of office or nonmanual field work directly related to management policies or general business operations of his employer or his employer's customers.

2. He customarily and regularly exercises discretion and independent judgment.

3. He regularly and directly assists a proprietor or an employee in a *bona fide* executive or administrative capacity, or he performs, under only general supervision, work along specialized or technical lines requiring special training, experience, or knowledge or executes, under only general supervision, special assignments and tasks.

4. He does not devote more than 20 per cent of his hours worked in the work week to activities not directly and closely related to the performance of the work described in paragraphs (1) through (3) of this section.

5. He is compensated for his services on a salary basis at a rate of not less than $75 per week, exclusive of board, lodging or other facilities.

Again, the "short test" below can be applied for quick reference in place of the one above:

An administrative foreman is compensated on a salary or fee basis at a rate of not less than $100 per week, exclusive of board, lodging or other facilities. His primary duty consists of the performance of office or nonmanual field work directly related to management policies or general business operations of his employer's customers, including work re-

quiring the exercise of discretion and independent judgment.

Examples — It is important to realize that placing a limitation on the amount of nonexempt work is meant to distinguish between the bona fide executive and the "working" foreman who regularly performs production or other work unrelated or only remotely related to his supervisory activities. Everything pointed out by the federal wage-hour law rules reveals that a foundry foreman or supervisor should be entitled to exemption.

One point should, however, be kept in mind. One type of "working" foreman common in American industry works alongside his subordinates. Workers meeting the above "tests" need not be paid overtime, but work of the same nature as that performed by this employee's subordinates should not be counted as nonexempt. If the work is substantial, the exemption could not apply to the working foreman.

Another type of "working" foreman in a foundry who could not be classified as exempt is one who spends a substantial amount of time in work which, although not performed by his subordinates, consists of ordinary production work or other routine, recurrent, repetitive tasks which are a regular part of his duties.

Such an employee might be termed holding down a dual job. For example, he may be a foundry supervisor-clerk or a supervisory worker whose job is combined with some other skilled or unskilled occupation. In short, his nonsupervisory duties in such instances are unrelated to anything he must do to "supervise" the employees under him or to manage the department. They are in some instances mere "fill-in" tasks performed because the job does not involve sufficient executive or supervisory duties to occupy his full time.

It is not enough to be considered a foundry foreman or supervisor in title alone; the job performance must meet all wage-hour "tests." In general, job titles are insufficient as yardsticks for claiming exemption.

Lists CO_2 Process Material

A select bibliography on the CO_2 process for hardening molds and cores has been issued by the Science and Commerce Department, Sheffield City Libraries, Sheffield, England. It is No. 62 in a series of research bibliographies and contains 65 references. Copies may be obtained free upon application to the City Librarian, Central Library, Surrey Street, Sheffield 1, England.

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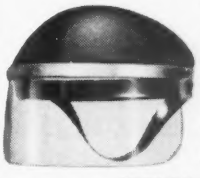

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Trouble Shooting

By C. W. AMMEN

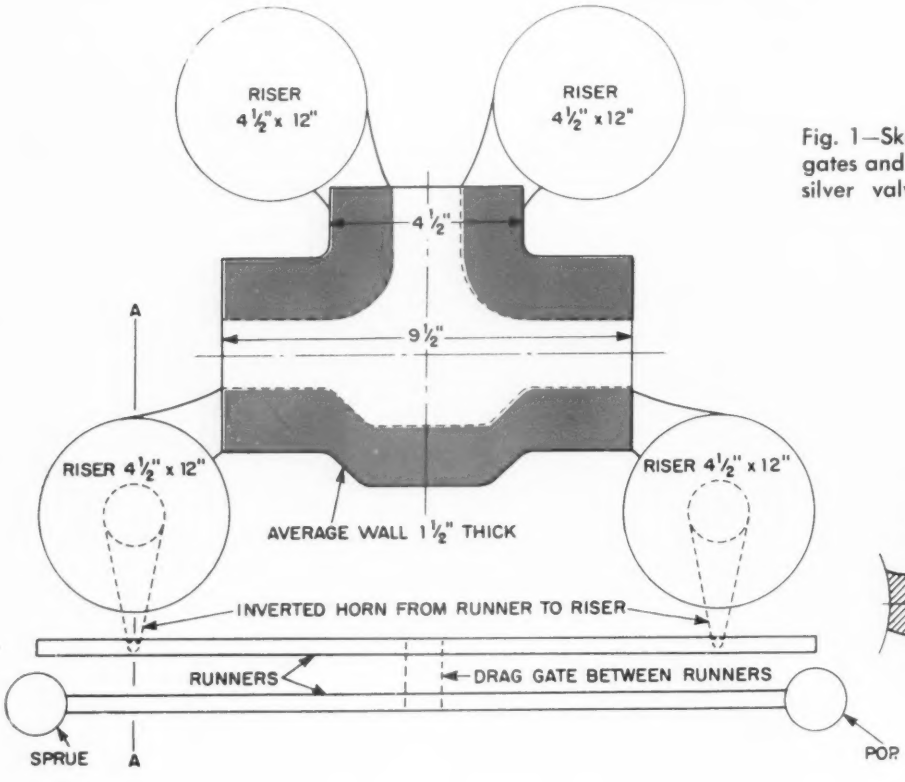
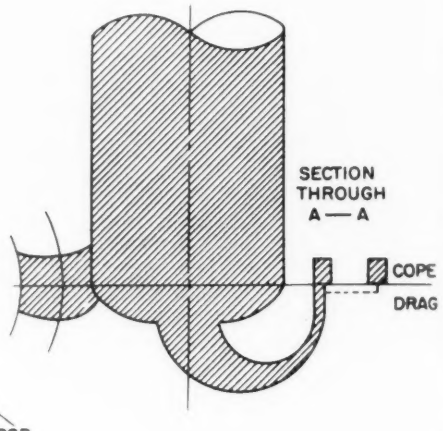


Fig. 1—Sketch shows arrangement of gates and heads for casting a nickel-silver valve. Below is Section AA



Casting Nickel Silver

Dear Charlie:

Comes a time in every foundryman's life when he figures he has just lost his touch or someone is burning a black candle on him. You know I have made short, long, fat, and skinny castings in all breeds of metal except the high nickels or so-called nickel silver. One of my special customers, who makes valves, received an order for six special plug valves for some sort of chemical deal. They were to be made of Federal specification WWP-541 nickel silver. Now, with the profit shot, along with our nervous system, we seek aid. Since there probably are no more possible ones we could produce if we tried, I will not list the defects we get. I would like a little plain, untechnical information on basic practice without the use of x-ray, laboratory, and the like, of which we have none. Inclosed is a blueprint showing size of valve, approximate weight, etc.

Sincerely,
Sam

Dear Sam:

Since your information is sketchy but the print is good, let's take it from there.

Talking about prints reminds me of the fellow who used to say he could read the hell out of the blue part, but the little white lines were what confused him. On your print, the blue reads fine; now I'll tackle the white lines. You have come to the right man, for I have made some of the prettiest, shiniest nickel silver scrap ever produced. As the old saying goes, it is a pretty poor molder who cannot make his own scrap. So off we go. Take your time and study the job out carefully—then decide! Consider the tools and equipment with which you have to work.

In making nickel silvers, first let's consider the molding sand. Nickel silvers are quite sensitive to gas from organic materials in molding sand and are poured quite hot in comparison with the average run of nonferrous alloys. Sands high in organic binders and with excessive fines will not give good results.

A sand having a grain size of about 95 with 17 to 19 per cent clay will give good results. The best procedure I have found is to use a good base sand of the proper grain size (sharp silica WD). With a mixture of 50/50 western and rebel bentonite, work up a good synthetic sand. The mix should fall somewhere within the limits of 40 to 70 permeability, 4.0 to 5.5 per cent moisture, 2 to 3 green shear, 6 to 8.5 green compression.

Use cores which are good and dry

and will collapse readily. A coating of graphite and molasses-water blacking will prevent burn-in and give a clean casting. The same basic core practice used in ordinary bronze practice usually will suffice. A high-refractory, sharp-sand core with sufficient collapsibility to prevent tearing, with or without wash, will do the job.

Remember, far more castings are lost in nickel silvers because of insufficient risering and low pouring than because of excessive risering and high pouring temperatures. A practice similar to that used in gating and heading aluminum-bronze is the correct one to adopt. It is my opinion that aside from proper molding sand and cores, the following are the most important factors in making a sound clean casting in nickel silvers:

Fast melting in small, clay-graphite crucibles, letting the size of the casting determine the size crucible. For example, if the casting plus gates and heads weighs 100 lb, use a 150-lb crucible.

If pouring small castings, use a crucible only large enough to pour a few molds. I have a preference to oil-fired small pits, using a low-sulphur, light oil, with a slightly oxidizing or natural atmosphere (my preference is probably due to my luck with this type of a rig).

Deoxidize Carefully

Employ careful and methodical deoxidizing practice and check with a test cock cut in the corner of the mold. If it shrinks, O.K. If it puffs, repeat the deoxidizing.

Pour hot metal (general range 2300 to 2600°F for light work, 2250 to 2400°F for heavy) into a gating system which will allow the cavity to be filled rapidly with minimum metal agitation. This goal can be accomplished best by not crowding the flask (fewer castings per mold) and by careful design of flowoffs. Provide enough large heads to do the job, and cover the risers with slab cores to prevent sucking. Vent cope and drag very well.

Now to your plug valve. From the print, the casting looks as though it would weigh about 40 lb finished and cleaned up. Since it takes about three times the casting weight for gates and heads on a job of this nature, we will require about 160 lb. Fig. 1 shows an arrangement of gating and heading which should produce clean, sound castings.

For a pouring weight of approximately 170 lb, using a crucible of say No. 70 size, which has about a 230-lb working capacity, we will make up a charge of 200 lb, as follows: 50/50 Cu-Ni shot, 40 per cent; No. 1 copper, 42.5 per cent; 99.9 zinc, 8.5

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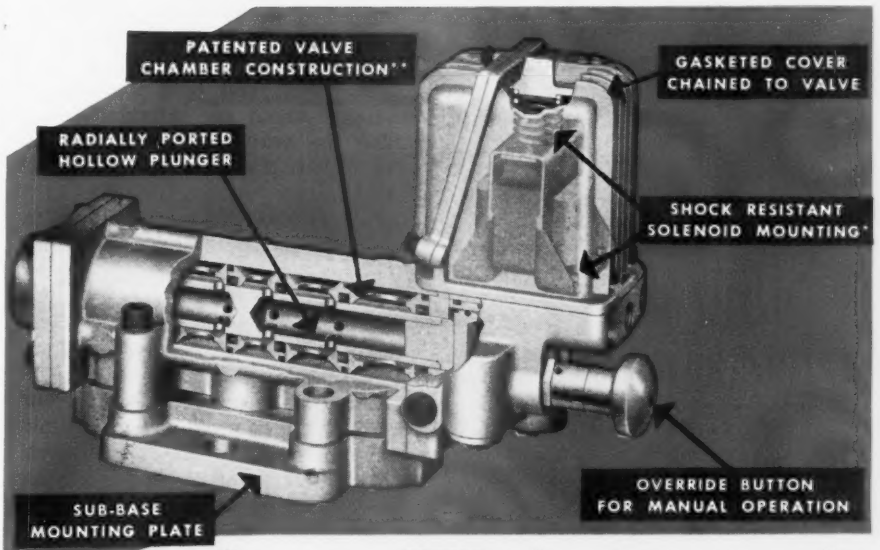
"B"-TYPE HIGH SPEED, HIGH CAPACITY SOLENOID VALVES


PATENTED VALVE CHAMBER CONSTRUCTION**
GASKETED COVER CHAINED TO VALVE
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*Patent Applied For **U. S. Patent No. 2,645,450

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Circle 747 on Inquiry Card—Page 245

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Circle 748 on Inquiry Card—Page 245

per cent; pig lead, 5.0 per cent; and pig tin, 4.0 per cent. Add 5 lb 99.9 Zn to take care of zinc loss on a 200 lb melt.

Charge the copper on the bottom of the pot, add about 3 lb of zinc, pour in the 50/50 shot to fill up openings and bring this up to a high enough initial temperature to insure high initial pouring temperature under a light glass cover. Add the remaining zinc and stir. Melt well, add lead and tin, stir well, and hold for several minutes. About six minutes before pulling the heat add 1½ oz per 100 lb of 97 per cent manganese metal (0.10 per cent Mn).

After pulling the heat, plunge to the bottom ¾-oz of magnesium per 100 lb. This can be done by tying the correct amount of Mg to a rod with cotton twine. In approximately 4 minutes, move the crucible to pouring position and add 2 oz per 100 lb of 15 per cent phosphor copper. Pour the test cock. If it shrinks, pour mold or molds; if it puffs, repeat treatment. Pour flat, keeping a choke at all times. When metal reaches the cope top, stop off the sprue and pour hot metal into the heads.

Sincerely,
Charlie

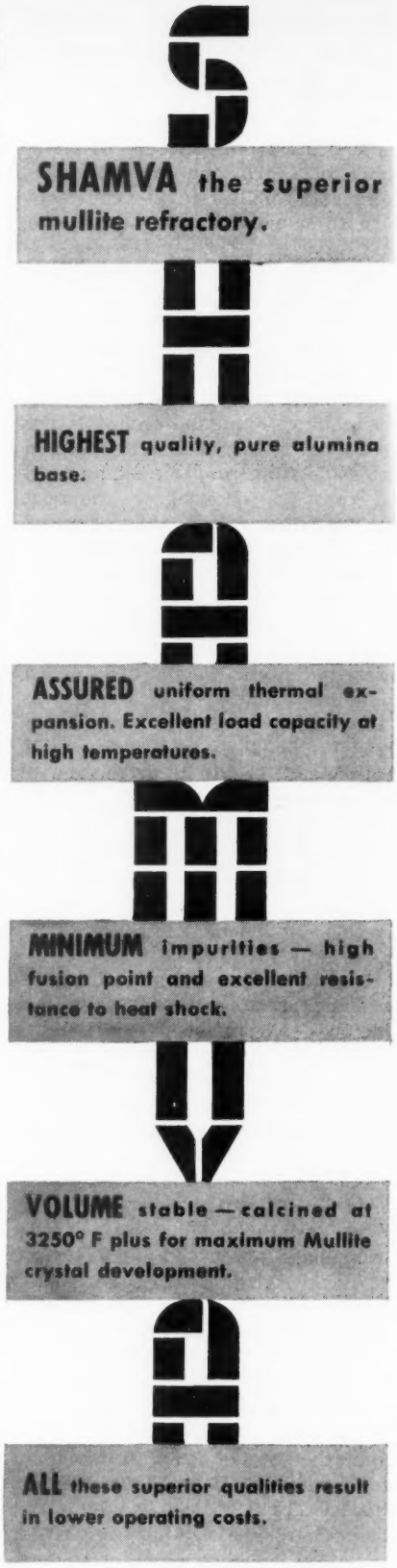
Cast Iron Specifications Are Compiled in New Summary

A new "Summary of Cast Iron Specifications" has been released by the Gray Iron Founders' Society, National City-East Sixth Bldg., Cleveland 14. Edited by C. F. Walton, the society's technical director, the four-page leaflet covers the commonly used specifications of gray and nodular iron. Specifications for cast pressure pipe, soil pipe, valves and fittings also are summarized in the new publication.

Book Review

ASTM Standards on Copper and Copper Alloys, paper, 646 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $5.75.

Contains in their latest form 127 ASTM standards pertaining to copper and copper alloys. Standards cover specifications for electrical conductors, plate, sheet, rolled bar and strip, ingot, wire, pipe and tube, filler metal and method of tests for copper and copper alloys. Of the material included 50 of the specifications have been revised and a new specification for threadless copper pipe has been added since the previous edition.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Circle 749 on Inquiry Card—Page 245

Applications for Patents Must Be Made Promptly

Delay in Applying May Cost Right to Patent

By Albert Woodruff Gray

IN THE PATENT law as it was amended in 1952 are two warnings against delays in applying for patent protection of inventions. In many instances disobedience has cost the applicant the right he might otherwise have had to a patent.

These provisions state, in part, "A person shall be entitled to a patent unless he has abandoned the invention," and "In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other."

Before a Federal court for decision a few years ago was an action to determine the right to a patent claimed by two applicants for the invention of a regulator for controlling the movements of an electrode in an electric arc furnace.

One of these applications had been filed on Aug. 12 and the second on Sept. 16 of the same year. The discovery of the second applicant had been made two months before the application was filed, whereas the first applicant had made his discovery a year and a half before. In denying a patent to the first applicant and awarding it to the second and more diligent, the court said of the failure to comply with those provisions of the patent law relating to delay, "He did nothing until after he had learned of the activity of his rival."

Similar circumstances were involved in litigation over the invention of glass used in the manufacture of incandescent electric light globes that had been held secret by the manufacturer for nine or ten years. When a trusted employee of this glass company divulged the secret to a competitor, the company applied for a patent and upon its issuance charged the competitor with infringement.

In its defense to the action, the competitor contended that the patent was invalid and that by the delay the inventor had forfeited its right to that protection. In its decision holding the patent void and

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Circle 751 on Inquiry Card—Page 245

the competitor innocent of infringement, the Federal court said:

"The conduct of the parties in carrying out the scheme of secret use and profit is proper evidence of its object and effect. It would be a contradiction to say that an inventor could both give up and hold the right to secure a patent. Here we have a continuous and uniform course of conduct for upward of nine years. It is impossible to see how such a course of conduct is reconcilable with a subsisting purpose to adhere to the right to secure a patent. It has every token of practical repudiation of such a purpose.

"We may safely add to what we have already said of these rights that the first is in its nature and essence susceptible of exercise only in a way to evade or at least unduly to delay a disclosure of the invention in the interest of science and the useful arts, and with an intent to expand the statutory period of monopoly and thereby reap additional profits.

"The second is a means simply to acquire a monopoly subject to all the conditions and limitations of the patent laws. Such rights in our opinion are inconsistent in themselves—notably in the matter of profits available through use as distinguished from the sale of the invention—and in their respective relations to the patent laws. It is not conceivable that an inventor can consistently hold both rights throughout the same period of time, where the design is to use them for purposes and with results like or similar to those here shown."

Reasons underlying this feature of the patent law that are now embodied in the statute were laid down by the United States Supreme Court a century ago. There an inventor delayed applying for a patent for eight years and then only when he discovered his invention was being adopted by a competitor. In sustaining the decision of the lower court which held the patent, by reason of this long delay, to be invalid and not infringed, the Supreme Court said:

"It is undoubtedly true that the limited and temporary monopoly granted to inventors was never designed for their exclusive profit and advantage. The benefit to the public or community at large was another and doubtless the primary object in granting and securing the monopoly. This was at once the

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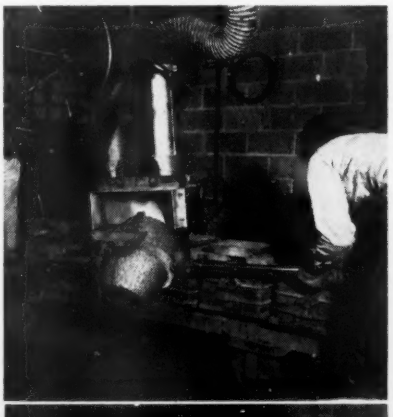
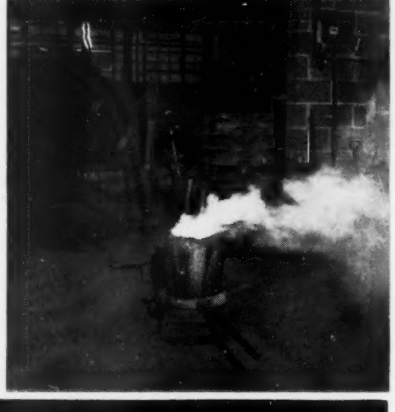


BEFORE HAWLEY FUME CONTROL

dust and fumes were a problem.



View of adjustable hood shown at left. This new design, lightweight, detachable, stainless steel hood is so simple it c'n reasonably be adapted to any mechanical pouring device in *any* foundry, regardless of size. There's a Hawley Fume Control System for every foundry. Send for Bulletin 555.

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equivalent given by the public for the benefits bestowed by the genius and meditations and skill of individuals and the incentive to further efforts for the same important objects.

"The true policy and ends of the patent laws enacted under this government are disclosed in that article of the Constitution, the source of all these laws, viz., 'To promote the progress of science and the useful arts,' contemplating and necessarily implying their extension and adaptation to the uses of society.

"By correct induction from these truths it follows that the inventor who designedly and with a view of applying it indefinitely and exclusively for his own profit, withholds his invention from the public, comes not within the policy or objects of the Constitution or Acts of Congress.

"He does not promote and, if aided in his design, would impede the progress of science and the useful arts. And with a very bad grace could he appeal for favor or protection to that society which, if he had not injured, he certainly had neither benefited nor intended to benefit.

"Hence if during such a concealment, an invention similar or identical with his own should be made and patented, or brought into use without a patent, the latter could not be inhibited nor restricted, upon proof of its identity with a machine previously invented and withheld and concealed by the inventor from the public.

"The rights and interests, whether of the public or of individuals, can never be made to yield to schemes of selfishness or cupidity. Moreover that which is once given to or is invested in the public cannot be recalled or taken from them."

REFERENCES

35 U.S.C.A., Sec. 102
Payne v. Moore, 181 Fed. 2d 243, April 3, 1950
Macbeth-Evans Glass Co. v. General Electric Co., 246 Fed. 695.
Kendall v. Winsor, 62 U.S. 322, December, 1858

Bureau of Standards Selects Site for New Laboratories

Approximately 550 acres of land near Gaithersburg, Md., has been selected for relocation of the Washington laboratories of the National Bureau of Standards. New buildings to replace present research facilities are planned, and transfer of operations to the new location is expected to be completed in about 5 years.

Present site of the bureau, on Connecticut Avenue in Washington, was occupied in 1903.

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Foundry Group Meetings

Gray Iron Founders: Gray Iron Founders' Society will hold its 28th annual meeting at the Homestead Hotel, Hot Springs, Va., Oct. 31-Nov. 2, 1956.

High lights of the national meeting will be a presentation of the preliminary findings of the society's new marketing research survey by Richard C. Meloy, marketing director. The society's Marketing Committee will release data collected from product engineers, purchasing agents and the foundries themselves.

Guest speaker at a luncheon on Nov. 1 will be Ralph E. Lapp, a widely known atomic energy consultant whose subject will be "The World of Tomorrow."

C. F. Walton, the society's technical director, will speak on the impact of the new *Gray Iron Handbook*.

The business program will conclude on Nov. 2 with an unusual session on "The Problems of Small Jobbing Foundries by Men Who Run them."

Program details follow:

Wednesday, Oct. 31

9:30 a.m.—Meeting of retiring board of directors.
10 a.m.—Committee meetings.
6.30 p.m.—President's reception and dinner.

Thursday, Nov. 1

9:10 a.m.—Earlybird attraction: National Industrial Council film on the use of union dues for political purposes.
9:30 a.m.—Business meeting. Reports by GIFS officers and staff.
11 a.m.—Presentation of printed annual reports of GIFS standing committees. Brief remarks by committee chairmen.
12 noon—Luncheon. Speaker: Dr. Ralph E. Lapp. Subject: "The World of Tomorrow."
2 p.m.—Business session. A Marketing Seminar.
"The State of the Gray Iron Industry"—Richard C. Meloy, marketing director.
"Is Our Sales Effort Keeping Pace with Technology?"—W. S. Thomas, Emmaus Foundry & Machine Co., Emmaus, Pa.
"Preliminary Results of Market Research Surveys of Foundries, Product Engineers and Purchasing Agents"—Mr. Meloy.
4:30 p.m.—Committee meetings.
6:30 p.m.—Industry banquet and entertainment.

Friday, Nov. 2

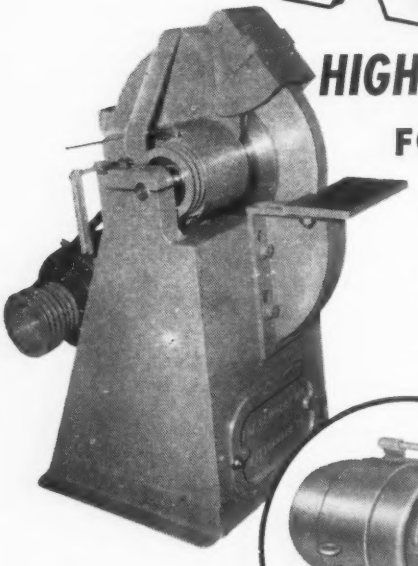
9:30 a.m.—"Impact of the Gray Iron Handbook"—C. F. Walton, technical director.
"Problems of a Small Jobbing Shop—by Some Men Who Run One."
12 noon—Luncheon. Introduction of new officers and directors. Presentation of winners, 1956 Redesign Contest, 1956 Citations and Awards.

Oregon: A "Cleaning Room Clinic" was the feature of the season's final meeting of the AFS chapter on May 16 at the Heathman Hotel, Portland, Oreg. Panelists were Milan Sepich, Western Foundry Co.; John Peterson, Electric Steel Foundry Co.; Hal Story, Oregon Brass Works Inc.; George Bogue, General Tool and Carl Irwin, Ingersoll-Rand Co.

The chapter voted to contribute $1 per member to the building fund for the Oregon Museum of Science and Industry. Individual contributions also are solicited.—*Bill Walkins, Electric Steel Foundry Co.*

FOX

HIGH-SPEED STAND GRINDERS



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1. Speed changes can be made at the proper wheel diameter.
2. Less space is required for each installation.
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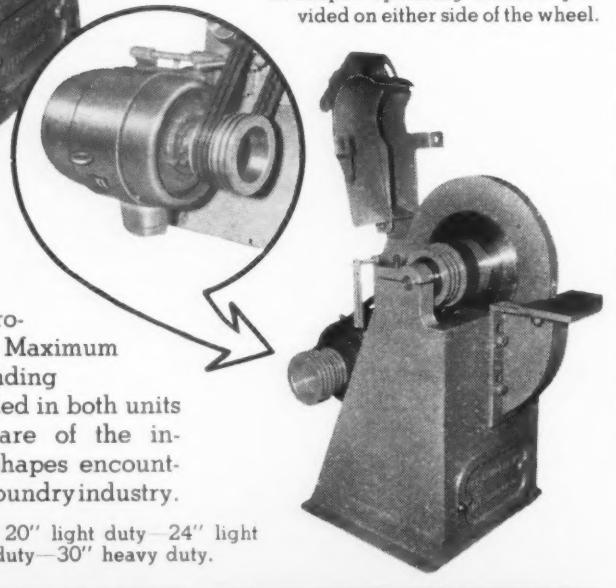

These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.

Circle 754 on Inquiry Card—Page 245

Bradley H. Booth, Clarence A. Gehrman, Donald Gerlinger, John Haskins, Walter Napp, Martin Peterman, George Tisdale, Harold Warner and Jeff Westover.—*John E. Hubel.*

Metropolitan Brass: Metropolitan Brass Founders Association will hold its 46th anniversary celebration on Oct. 13 at the Brass Rail, 100 Park Ave. at 40th St., New York. Cocktails, dinner, floor show, dancing and flowers for all who attend are included in the program.—*George Staub.*

Steel Founders' Society: Market research will come in for considerable discussion at the 54th annual fall meeting of the Steel Founders' Society of America. The meeting will be held Sept. 24-25 at the Greenbrier, White Sulphur Springs, W. Va.

One session to be devoted to "Progress in Market Research" will include a market survey report by F. Kermit Donaldson, SFSA executive vice president, and two talks — "The Promise of Market Research" by Allen M. Slichter, president, Pelton Steel Casting Co., Milwaukee, and "America's Highway Program" by Kenneth Lindsay, executive vice president, Iowa Mfg. Corp.

Among other business session subjects will be a report by Charles W. Briggs, technical and research director, on visits to European foundries and the International Foundry Congress, and a talk on "Growth Through Research" by Fred W. Manley, Minnesota Mining & Mfg. Co.

Howard F. Park Jr., vice president, General Steel Castings Corp., Granite City, Ill., and SFSA president, will preside at the meeting.

Schedule Regional Conference For Philadelphia, Apr. 12-13

An East Coast Regional Foundry Conference is planned for next Apr. 12-13 at the Benjamin Franklin Hotel, Philadelphia. Sponsoring chapters of the AFS are the Philadelphia, Metropolitan and Chesapeake groups, with Philadelphia serving as the host chapter.

Technical sessions are planned for Friday morning, Friday afternoon and Saturday morning. A banquet is scheduled for Friday evening. Complete program will be announced soon.

Walter Giele, Walter Giele Co., Lebanon, Pa., chairman of the Philadelphia chapter, is general conference chairman. R. A. Colton, Federated Metals Division, American Smelting & Refining Co., chairman of the Metropolitan chapter is co-chairman.

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Tru-Steel sells and stays sold on the basis of test and comparison with any other. Write us.

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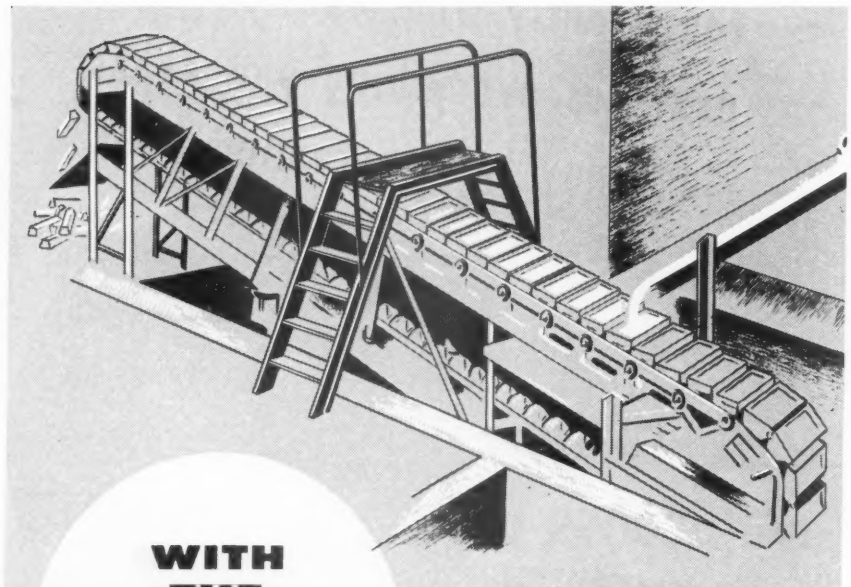
Circle 755 on Inquiry Card—Page 245

Simplify Pig Casting Operations . . .



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Circle 756 on Inquiry Card—Page 245

Plan Your Maintenance— And Watch Costs Go Down

Even the Smallest Shop Needs a Planned Program

By Ernest W. Fair

A DAB of oil here, a twist of a wrench there, a tightening of a belt, an adjustment of tension now and then, all of these actions constitute maintenance of a sort—the wrong sort, for all are haphazard.

Good maintenance is never haphazard. It is planned and carefully programmed in even the smallest shop. Without such planning and programming, equipment life is wasted, production dollars are allowed to fritter away and costs rise on every piece of work turned out in the shop.

Maintenance planning should be set up and regulated to fit the equipment and schedules in each shop, for no two are exactly alike. Literal adoption of a tight schedule used by one shop may be utterly useless and wasteful in another.

There is, however, a basic skeleton around which each such maintenance program should be built. With this skeleton, which is presented in the following paragraphs, any shop official can set up such a program of his own. It will suggest the individual points that should be a part of his own, tailor-made maintenance plan or program.

First, determine just who will be responsible for application of the program after it has been drawn up. Without fixed and definite responsibility by one individual in the organization, the program will falter, no matter how good the plan.

In turn, a definite degree of responsibility must be assigned to every man or woman on the shop staff who uses any of the equipment. Each should know and understand the maintenance plan and, particularly, his own part in carrying it out.

Financial support of the plan is vital. The program always should take care of this phase of maintenance, and the sums allotted it should be flexible enough to provide for unusual conditions and circumstances.

Approval of management may well be required, under the program, when estimated cost of labor and materials exceeds a certain amount (usually about $25). Such a stipulation maintains a degree of control over costs. Minor expenditures best can be left to people in the shop concerned with maintenance, thus avoiding useless and endless recordkeeping by the shop official in charge of the maintenance program.

It is extremely difficult to set a

fixed sum for maintenance since breakdowns, unforeseen high-production schedules and other factors may cause wear and tear on shop equipment well ahead of schedule. The budget set up by shop management should, therefore, have a degree of flexibility which will allow for the unforeseen.

Maintenance records are vital to any good program. They should be set up at the very start and be maintained as scrupulously as records on receipts and expenditures in the front office. The best procedure is to set up an individual card record for each piece of major equipment in the shop. This card should detail the maintenance history of that piece of equipment. Usually such records are kept in the office of the individual in charge of the maintenance program and are kept by him or a clerk under him.

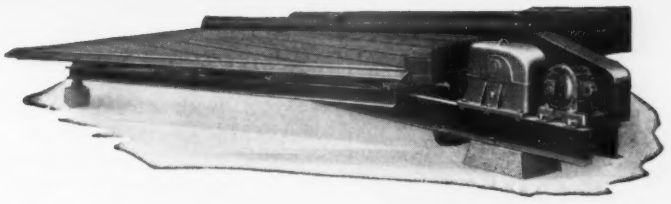
Work schedules for periods directly ahead should be part of the program. These should be made up on three classes of work: 1. Jobs which definitely can be planned well ahead, such as inspections and routine jobs. 2. Jobs which may vary with conditions, but nevertheless must be fitted in at approximate times. 3. Jobs which must be done as emergencies arise. Flexibility in the master schedule is needed to handle the latter type of maintenance jobs.

Keep Good Tickler File

A good tickler file also is a vital part of any shop maintenance program. This file should be arranged to indicate work orders and data on forthcoming jobs to be done. It should show all maintenance jobs that have been scheduled definitely for fixed dates and should provide accompanying "check" spaces for initialing to indicate that the job has been done. A warning system also is an aid in such a file—an additional card of another color set up from a week to two weeks ahead of each such date so that if any preliminary planning need be done or parts ordered, everything can be ready for each routine maintenance job on the scheduled date.

A daily work program is the next step in the schedule. This program should be made out from the outline of work ahead, with allowances for fitting in emergency jobs. Without such records, maintenance easily becomes haphazard. With records of this type, even the most minute maintenance procedure acquires fixed standing and responsibility and is certain to be handled properly.

Maintenance material requirements should be calculated when the program is set up. When this procedure is followed, control of cost of main-



It Pays to Recover Non-Ferrous Metallics from Waste Materials

The recovery of non-ferrous metallics from foundry and machine shop wastes can be very profitable if a SuperDuty® table is used.

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machined all over and engineered to fit the needs of your foundry

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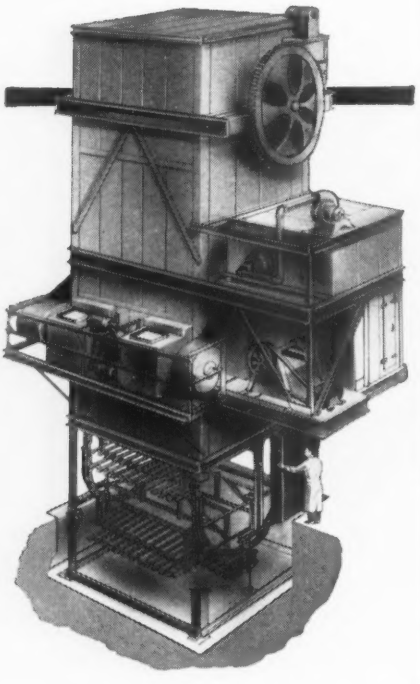
Anderson Pattern Inc.

MUSKEGON MICHIGAN

Circle 758 on Inquiry Card—Page 245

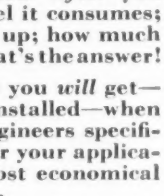
HOW MUCH DOES A FOUNDRY OVEN COST?



We could tell you down to the penny what the conveyor core oven pictured above cost. But that wouldn't really be the answer you would want.

Because the real cost of any oven comes *after* it's been installed. *After* you find out how much fuel it consumes; how many rejects pile up; how much production you get. That's the answer!

And that's the answer you *will* get—before the oven is installed—when experienced MOCO engineers specifically design an oven for your application. It will be the most economical piece of equipment possible. Why not contact MOCO today?



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Circle 759 on Inquiry Card—Page 245

tenance is much closer. It also assures those concerned that funds will be available for maintenance work as it arises and that nothing need ever be delayed because funds are lacking. Such delays comprise one of the major mistakes in maintenance in many shops. Each time that needed maintenance is postponed for any reason whatsoever, the future life of that particular piece of equipment is shortened by every day that goes by until the work is done.

Obtaining the proper data for correct maintenance also is an important part of any such program. A file of service and maintenance data as supplied originally by the manufacturer of each piece of equipment should be set up. Where these have been lost, replacements should be secured immediately. This system helps to keep out maintenance mistakes which sometimes can be as costly as the complete absence of maintenance.

Such a file also should contain lubrication charts and other maintenance data from every other possible source. This information should be kept available not only for routine maintenance procedures, but also as a source of data when something unexpected arises and there is no available experience on the shop staff to handle the situation.

Any good maintenance program also allows for periodic training and instruction not only of the individual or individuals in charge of maintenance in the shop, but of every man and woman who uses any of the machines. The over-all job of good, low-cost maintenance always is accomplished more easily in any shop where everyone on the staff is maintenance-conscious and is kept that way through a periodic maintenance demonstration or discussion.

Time charts should be established for each machine in the shop. These charts assure shop management that each unit receives proper maintenance attention as frequently as needed. They also aid in the integration of scheduling so that there are no periods of heavy maintenance load and others with relatively nothing to do.

Gray Iron Research Institute Elects at Annual Meeting

Trustees of the Gray Iron Research Institute Inc. at their annual meeting June 27 in Cleveland elected R. R. Washburn, Plainville Casting Co. as its president.

Other officers elected were: Vice president, J. L. Brooks, Sparta Div., Muskegon Piston Ring Co.; secretary, H. W. Ruf, Grede Foundries,

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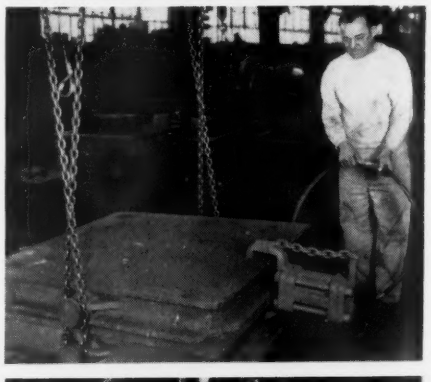

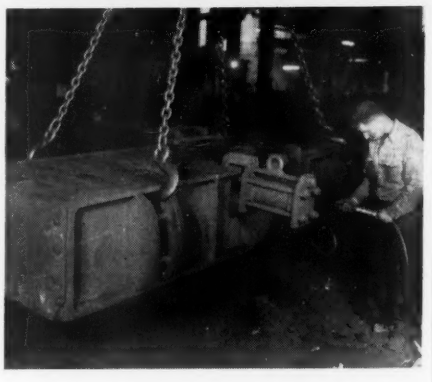

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Inc.; treasurer, T. W. Curry, Lynchburg Foundry Co.

Members of the executive committee are: R. R. Washburn, chairman; W. L. Seelbach, Superior Foundry Inc.; J. L. Brooks; E. L. Roth, Motor Castings Co.; F. J. Sherwin, Chicago Hardware Foundry Co.; and S. H. Bullard, the Bullard Co. S. C. Clow, James B. Clow & Sons, Coshocton, O., was appointed chairman of the Research Steering Committee.

Magnesium Association Plans 1956 Convention in Chicago

Twelfth annual convention of the Magnesium Association will be held in Chicago, Oct. 4-5, with headquarters at the Drake Hotel. Two sessions and a luncheon are scheduled. Morning sessions will begin at 9:30 a.m. and afternoon sessions at 2:30 p.m.

Among many papers scheduled for presentation, several are of wide general interest. Representatives of Hughes Aircraft Company will discuss the important new magnesium-thorium alloy in a general survey and evaluation of available data and experience. Increased applications of magnesium in electronics will be presented by General Electric Company personnel. A detailed discussion of the use of die cast magnesium parts in fractional horsepower electric motors is also scheduled.

Feature of the convention will be a panel presentation of "Magnesium Up-to-date," designed to bring those in attendance up to the minute with regard to progress of the industry both in product and processes.

Full details of the program and hotel facilities, as well as registration cards, are available from the Magnesium Association, 122 East 42nd St., New York 17.

Lists Small Business Sites

Planned to help small firms in planning for the future, Small Business Administration, 811 Vermont Ave., N.W., Washington, has published a leaflet, available upon request from any of the agency's field offices.

Entitled "Sizing Up Small Business Locations," the booklet points out that continued success in a small store or service business depends a great deal on its location. Changes in living, working and shopping conditions cause certain locations to improve and others to decline, from a business-prospect viewpoint. An understanding of what is happening to a community is important in choosing a business location.

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because no matter how you look at it, you can watch your foundry sands being processed in either of the two pilot units, one HYDRO (wet), and the other DRY (air).

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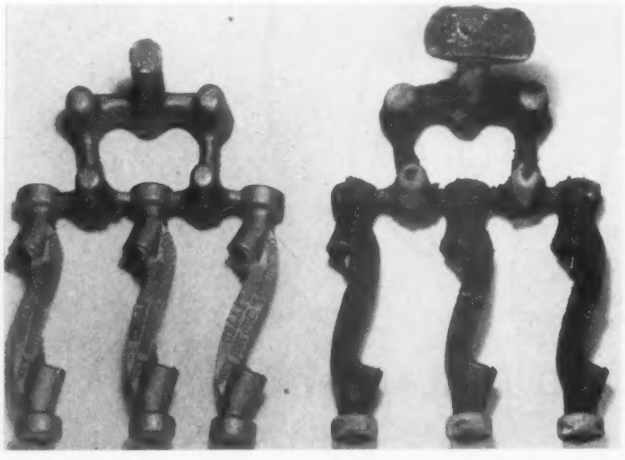
Circle 761 on Inquiry Card—Page 245

The Shakeout

Cast Steel Grit Solves Cleaning Problem

HIGH ABRASIVE CONSUMPTION in blast cleaning operations was a problem at the foundry of Ford Meter Box Co., Wabash, Ind., until the company solved it with the use of cast steel grit. Using a grit manufactured by Wheelabrator Corp., Mishawaka, Ind., Ford Meter Box cut consumption per 8-hr day from 200 to 75 lb. The cleaning work load is 35 tons of poured brass per



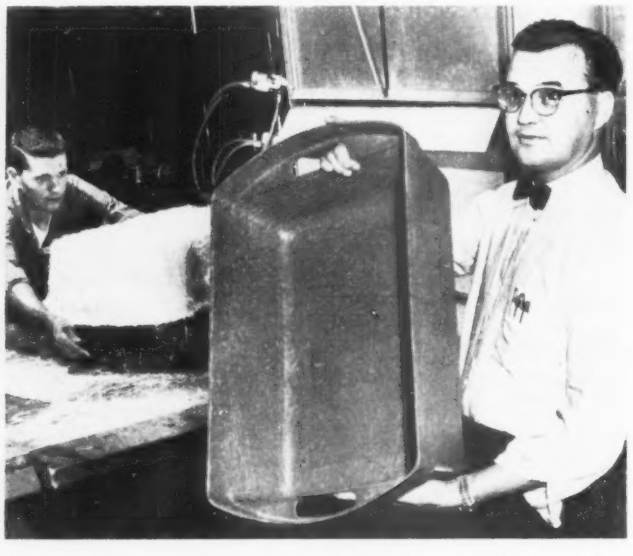
week plus 2 tons that are given a second cleaning for extra-fine finish. Most of the castings weigh less than 1 lb.

An additional benefit provided by the cast steel grit is improved finish. Castings have a cleaner, more satiny, shinier appearance. The illustration shows a closeup of brass water meter resetter bars after and before cleaning on the gate with the steel grit. Each gated group is $8\frac{1}{2}$ x 11 in.

For More Details Circle No. 457—Page 245

Plastic Tote Tray Is Light in Weight

TOTE TRAY molded of glass fiber and polyester resin has many potential uses in plants where small production items are placed in tote pans and conveyorized. The



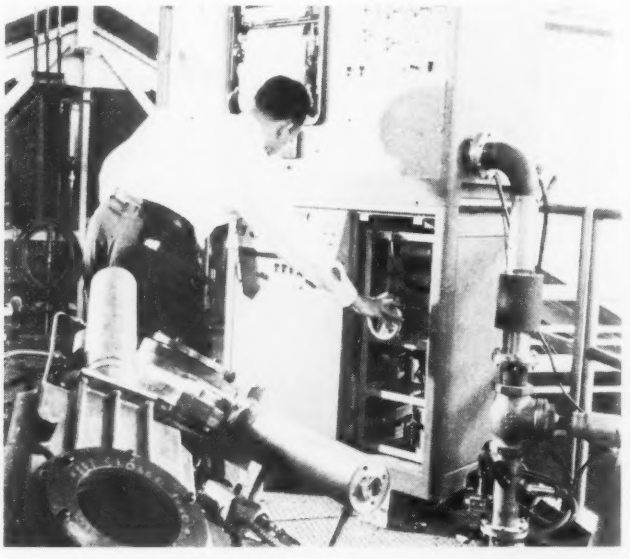
7-lb pans reportedly are comparable in strength to others which weigh several times as much. In addition, their flexibility absorbs shocks.

Rounded ends permit the pans to travel easily on conveyor line turns, and each pan is molded with slotted carrying handles. Manufacturer is the Firestone Tire & Rubber Co., Akron, O.

For More Details Circle No. 458—Page 245

Mass Spectrometer Analyzes Furnace Gases

MOLECULAR PARTICLES of gases literally are sorted and weighed continuously by this custom-built mass spectrometer, installed recently on the vacuum melting furnace platform at Metallurgical Products Dept. (formerly



Carboloy Dept.), General Electric Co., Detroit. Built by Consolidated Electrodynamics Corp., the unit helps determine and control progress of the high-vacuum process by analyzing gases produced in the furnace.

For More Details Circle No. 459—Page 245

Structural Plastic Panel Passes Fire Test

PLASTIC PANEL for industrial construction, chiefly for such applications as wall daylighting and skylighting, has been approved by Factory Mutual Laboratories, Norwood, Mass., as a "fire - retardant type" and has been granted the Factory Mutual seal of approval. Resolite Corp., Zelienople, Pa., manufacturer of the translucent fiberglass - plastic panel, states that the material is the first ever to win such approval, just as it was first to obtain the label of Underwriters' Laboratories, as it did in September, 1955.

The tests by Factory Mutual, which insure large industrial buildings against fire loss, proved the Resolite Corp. panel to be highly fire-retardant, combustible under direct flame, but not flame transmitting.

For More Details Circle No. 460—Page 245

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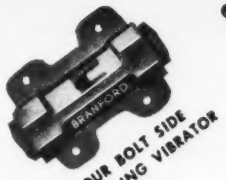

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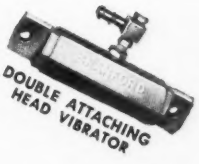
HOSE CLAMP

TWO BOLT SIDE MOUNTING VIBRATOR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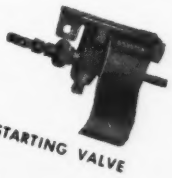
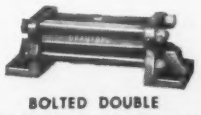
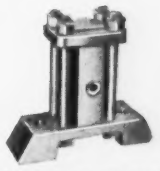

STARTING VALVE

HOSE ELBOW


BOLTED DOUBLE ATTACHING HEAD VIBRATOR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Circle 764 on Inquiry Card—Page 245

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Assures rapid shakeout on even heaviest castings

The *Foundromatic* shakeout weighs more than 40% of its rated capacity. It's this extra weight that slashes knockout time by providing *vigorous vibration* on *all* loads. Why buy extra capacity? The *Foundromatic* shakeout will give you all the reserve weight you'll ever need for a fast, clean operation.

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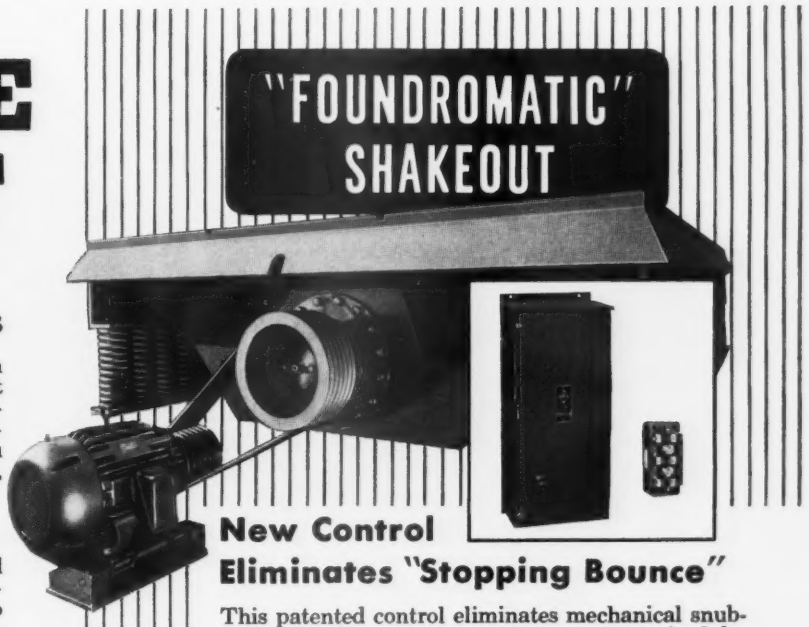
See your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletins 07B6365B and 07B8141.



New Control Eliminates "Stopping Bounce"

This patented control eliminates mechanical snubbing and the excessive maintenance required by friction checks. Control reverses motor torque of driving motor after speed has been reduced. With torque opposing rotation of mechanism, shakeout is brought to stop before stopping amplitude builds up. Smooth stop prevents damage to castings and flasks . . . prolongs life of motor and drive. A-4966

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Circle 765 on Inquiry Card—Page 245

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The finer grain of Zirconite* products offers cost-saving advantages in steel, iron, bronze, aluminum or magnesium foundry operations.

ZIRCONITE* PASTE WASH

Does not fuse with molten metal. Resists metal wetting. Prevents metal penetration. Produces smooth casting surfaces.

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Used as a filler in cores. Lowers permeability. Increases refractoriness.

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Eliminates the problems of burning-in and penetration. An excellent means of chilling heavy sections to promote directional solidification and to eliminate heavy risers.

Put the money-saving advantages of TAM* ZIRCONITE* products to work in your operation. Write our New York office for detailed information. Discuss them with our field engineers.

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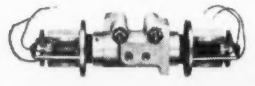

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Circle 767 on Inquiry Card—Page 245

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SOAP TO SILICATES

Soap, our first product in 1831, was followed 25 years later by silicate of soda used in our soaps. Silicates became our exclusive interest in 1904.

PQ research in special silicate properties has uncovered and developed new silicates for many valuable uses such as detergents for metal cleaning, sealants for porous castings, binders for cements.

Choose from our 40 products, liquid and dry ($2Na_2O:SiO_2$ to $Na_2O:3.75\ SiO_2$),a silicate for every need.

1831-1956 125th ANNIVERSARY

PHILADELPHIA QUARTZ CO.
1062 Public Ledger Building • Philadelphia 6, Pa.
9 Plants . . . . . Distributors in 70 Cities
TRADEMARKS REG. U.S. PAT. OFF.

PQ SOLUBLE SILICATES / METSO DETERGENTS

Circle 768 on Inquiry Card—Page 245

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

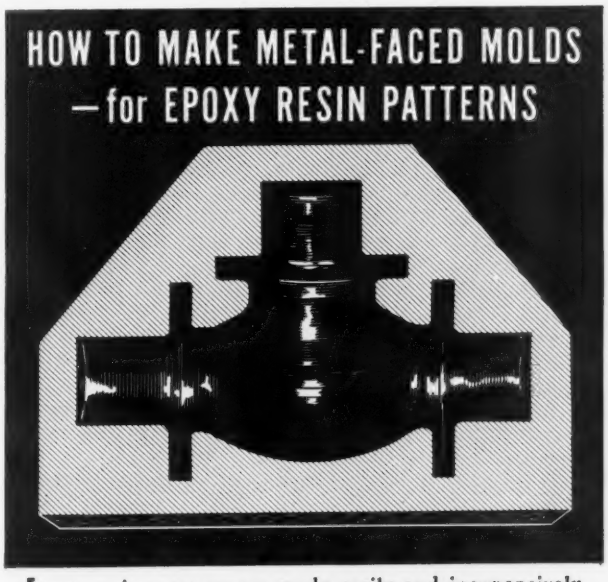
DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

Circle 769 on Inquiry Card—Page 245

HOW TO MAKE METAL-FACED MOLDS —for EPOXY RESIN PATTERNS



Epoxy resin patterns are made easily and inexpensively by casting in plaster molds faced with Cerro Alloy.

The method is described in detail in an article in MODERN CASTINGS entitled, "Three Ways to Make Epoxy Resin Patterns". This article reports a paper presented at the 1956 AFS Castings Congress by E. J. McAfee, Master Patternmaker, Puget Sound Naval Shipyard. We will send you a reprint of this paper on request.

CERRO DE PASCO CORPORATION

318 Park Avenue, New York 22, N. Y.

Circle 770 on Inquiry Card—Page 245

Centrifugal Casting Machine . . .

Quickly fixed

Suddenly the rocker arm and side support of this cast iron centrifugal casting machine cracked. The mold, containing a 1500-lb. semi-molten casting, broke loose in the foundry.

Fortunately no one was hurt. But it would take months to get replacement parts, and an urgent government contract would be jeopardized.

Then the foundry weldor suggested welding the parts with Ni-Rod "55"* electrodes. Two days later he had the machine back in operation. The entire job took only 20 lbs. of Ni-Rod "55" electrodes, saved the foundry $500 for replacement parts. Even more important — Ni-Rod "55" electrodes enabled the foundry to make delivery on time.

Today, four years later, this centrifugal casting machine *is still in regular use!*

Salvage defective castings, too

Many use Ni-Rod "55" electrodes for salvaging defective castings, too. Nine out of ten jobs require no preheat or postheat. And welds made with Ni-Rod "55" electrodes match the appearance of the base metal closely.

See how others simplify cast iron welding with Ni-Rod "55" electrodes. Write today for Inco's folder, "Repair Cast Iron Parts Quickly and Easily."

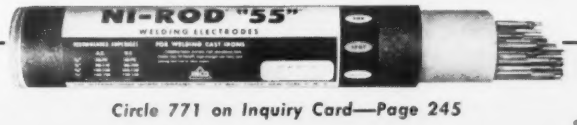
*Registered Trademark

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Welding Products**

Electrodes • Wires • Fluxes



Circle 771 on Inquiry Card—Page 245

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES: 500 FIFTH AVENUE • NEW YORK 18, N. Y.

Circle 772 on Inquiry Card—Page 245

"The Ringlift has helped us more than any other piece of equipment we have ever purchased", says General Manager of this leading Midwestern gray iron jobbing foundry.

After More Than 500,000 Tons

This hot, hard, lumpy sand is prepared, cooled and tempered by the Ringlift without prior addition of water. Sand is mixed, blended, screened, magnetically separated, triple aerated. You, too, can save by preparing your sand properly, right on the floor where it will be used. Investigate Ringlift today.

STATES ENGINEERING CORPORATION
922 W. BERRY STREET, FORT WAYNE, INDIANA

Circle 773 on Inquiry Card—Page 245

COST REDUCTION PROGRAMS

★*Organization* ★*Wage Incentives*
★*Methods Improvement* ★*Budgetary Controls*
★*Job Evaluation* ★*Diversification*

WALLEY & ASSOCIATES
SURVEYS • INSTALLATIONS • TRAINING
25 SEMINARY AVE., DAYTON 3, OHIO

Circle 774 on Inquiry Card—Page 245

EF

GAS, OIL AND ELECTRIC
FURNACES
For all annealing and heat treating requirements
THE ELECTRIC FURNACE CO. • SALEM, OHIO
Canadian Associates • CANEFCO LTD. • Toronto 1, Canada

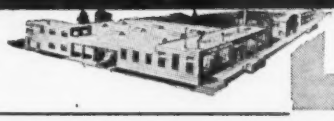
Circle 775 on Inquiry Card—Page 245

the right answer for every casting job

SUPERIOR CASTING ALLOYS

HENNING BROS. & SMITH, INC.

"Dependable service since 1922"
91-125 Scott Ave. at Randolph St., Brooklyn, N. Y.
HYacinth 7-3470-1, 2, 3



Brass • Bronze
Aluminum
Zinc • Lead • Tin
Zinc & Cadmium Anodes

Special alloys to meet the most exacting requirements of engineer and caster.

Laboratory controlled production. Shipments strapped on consumable pallets.

Circle 776 on Inquiry Card—Page 245

INCREASE PRODUCTION with the MURPHY PISTOL SPRAYER

$17.25
1/16" to ¼" pipe size
Any length nozzle desired

A squeeze of the trigger and the Murphy Pistol Sprayer instantly shoots a stream of blackening into inner pockets that could never be reached by old-fashioned brush or swab method. Designed by a foundryman, the Murphy Pistol Sprayer is ideal for cleaning permanent molds—aluminum and other metal, and for sand blasting.

Pipe size	1/16"	⅛"	¼"	⅜"	½"
Price F.O.B. Hamilton, O.	$17.25	$17.25	$17.25	$20.15	$25.30

Prices complete with 5 ft suction hose

EXTRA LONG NOZZLES FOR ⅜" SIZE

This size Sprayer can be furnished with nozzles up to 48" long for spraying ingot molds and hard to reach places . . . also available with curved nozzles up to 15" long.

Long Nozzle Sprayer $25.30

COMPLETE WATER ELIMINATION GUARANTEED WITH

We manufacture an extensive line of Aftercoolers (Vertical and Horizontal). Separators ½" to 6". Aftercoolers 50 cfm. to 10,000 cfm. Traps, (Air and Oil)

MURPHY COMPRESSED AIR EQUIPMENT

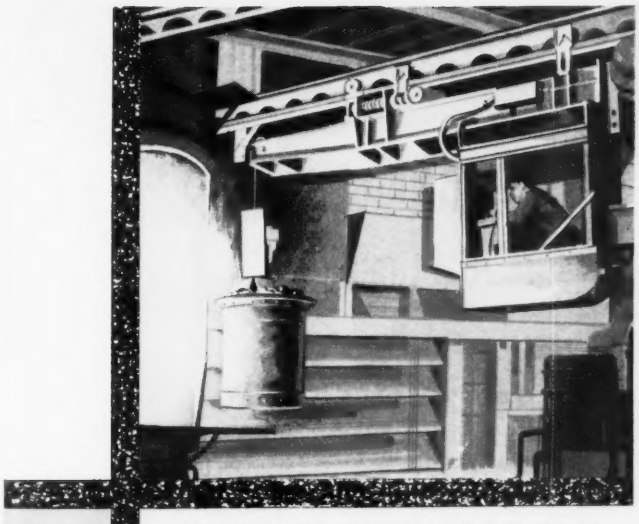
Shown here is a type B Automatic Separator guaranteed to remove all of the moisture and 90% of the oil from compressed air lines.

JAS. A. MURPHY & CO. INC.

1421 HIGH STREET : HAMILTON, OHIO

- AFTERCOOLERS
- SEPARATORS
- STRAINERS
- TRAPS
- SPRAY GUNS
- PISTOL SPRAYERS

Circle 777 on Inquiry Card—Page 245



FOUNDRY INSTALLATIONS

Commercial Contracting Corporation has installed or modernized foundries for all the major automotive producers. Utilize this experience to up-date your own foundry facilities.

Write for information

CCC COMMERCIAL CONTRACTING CORPORATION

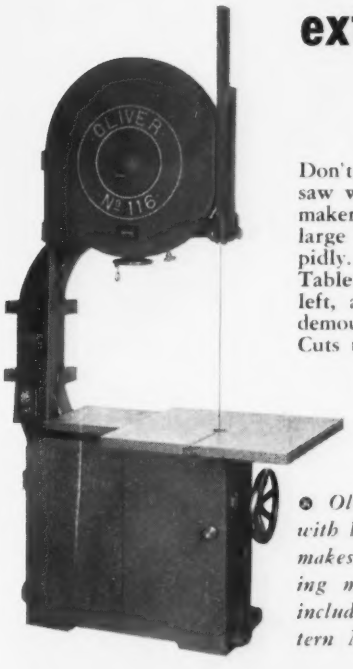
COMMERCIAL CONTRACTING CORPORATION

GENERAL CONTRACTORS

12160 CLOVERDALE • DETROIT 4, MICHIGAN

Circle 778 on Inquiry Card—Page 245

OLIVER 36-in. Band Saw takes 35" under guide to saw extra large patterns



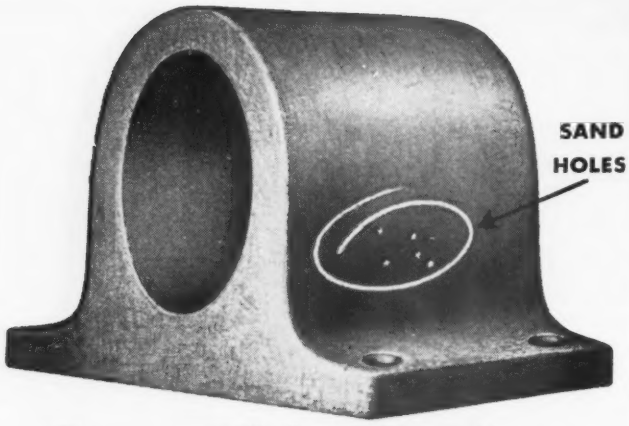
Don't let size and variety of band saw work slow up your pattern-makers! This Oliver handles large patterns smoothly and rapidly. Takes 35" under guide. Table tilts 45° to right, 7° to left, and is self-locking. Finest demountable ring-disk wheels. Cuts true and steady without vibration at all times. Motor-on-shaft drive. Write for Bulletin No. 116-DH.

● *Oliver Band Saws also made with 18", 30", 38" wheels. Oliver makes a wide line of woodworking machines for pattern shops including Pattern Lathes and Pattern Millers. Write for details.*

OLIVER MACHINERY COMPANY

Since 1890 GRAND RAPIDS 2, MICHIGAN

Circle 779 on Inquiry Card—Page 245



Save This Casting *with* SMOOTH-ON FOUNDRY CEMENTS

Often a perfectly good casting has blow or sand holes, surface blemishes, or rough and porous areas that detract from its appearance. But there's no reason why it can't *look* as good as it really is.

Simply use Smooth-On Foundry Cement. It goes on easily, quickly . . . hardens rapidly at a predictable rate . . . stays firmly in place.

SHADINGS TO MATCH ANY CASTING

- 4A • Medium Gray
- 4AA • Light Gray
- 4B • Dark Gray
- 8 • Aluminum
- 9 • Bronze or Brass

Quality Control That Assures You of Tight, Lasting Repairs

Every lot of Smooth-On Foundry Cement is laboratory tested for setting time, hardness and color. You can be sure of tight, lasting, good looking results every time, provided the directions are followed.

See how much better your castings will look after treatment with Smooth-On, known and used by leading foundries for more than 55 years. Try one or more of these cements at our expense. Write today—on your business letterhead—and we will send you free samples.

SMOOTH-ON MFG. CO., DEPT. 17
570 Communipaw Ave.
Jersey City 4, N. J.

FREE SAMPLES

80-399

SMOOTH-ON FOUNDRY CEMENTS

Circle 780 on Inquiry Card—Page 245

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

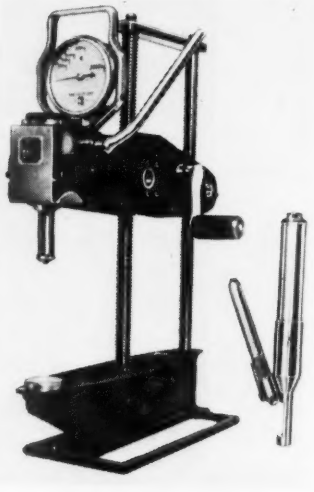
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES • SERVICE • STOCK • COAST TO COAST

Circle 781 on Inquiry Card—Page 245

Insure Quality Control of Castings

through accurate hardness tests



For over a quarter of a century, King Portable Hardness Testers have set the standard for portable Brinell Machines. Precision testing of parts of any size, in any position, anywhere, utilizing a 3000 Kg. load on a 10 MM. ball giving a clear sharp impression, are some of the principal features. This high standard of accuracy and performance has been integrated into a system of standard adapters for use with the basic unit, making the King Portable Brinell a machine of universal application. Weighs only 28 lbs. Write for complete description and specifications.

KING TESTER CORPORATION

DEPT. F 440 N. 13TH ST. PHILADELPHIA 23, PA.

Circle 782 on Inquiry Card—Page 245

CENTRIFUGALLY CAST

AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new
WATER-COOLED
Model M-WC
(Illustrated)

Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

Write for new Bulletin # 153 Illustrating Model M-WC

RESEARCH FACILITIES

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

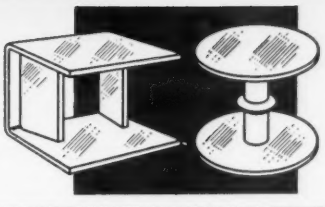
P. O. Box 947 Tulsa 1, Okla.

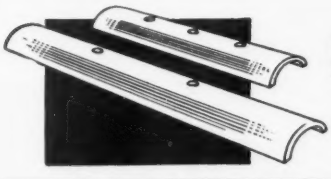
Circle 783 on Inquiry Card—Page 245

Exactly what you need

Chaplets

. . . extensive line, many patented and exclusive features.





Radius Chills

. . . all gauges and radii.

Pattern Plates

. . . aluminum and Dowmetal

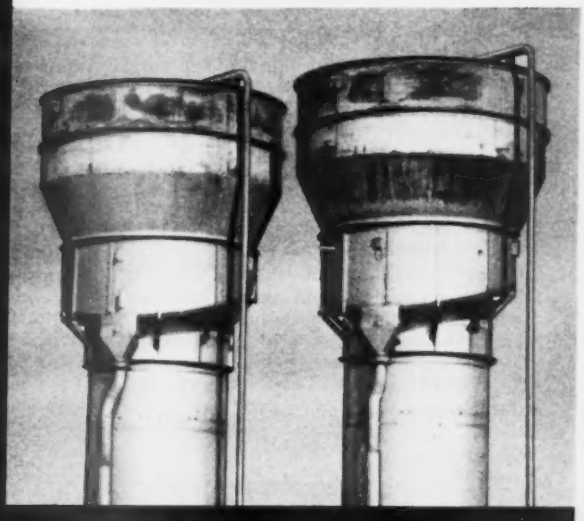
Complete information in Catalog No. 16 and other literature sent on request

Manufactured by
Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

Circle 784 on Inquiry Card—Page 245

SCHNEIBLE

YOU CAN BE SURE YOUR CUPOLA EMISSIONS ARE CONTROLLED WHEN YOU USE A SCHNEIBLE "SW" COLLECTOR



Selection of your cupola collector is becoming more and more important. The enactment each year of municipal codes that restrict cupola emissions to certain definitive limits prove this. Schneible's "SW" Type, America's most popular wet method cupola collector, you can buy with complete confidence.

Schneible Cupola Collectors are designed for simplicity and efficiency of operation. They are practically maintenance-free, with no moving parts, no nozzles to clog, nothing to freeze in the coldest weather.

Schneible Cupola Collectors are economical, too. The savings effected in roof maintenance alone will, in many instances, return your initial investment over a short period of time.

Add economy and easy maintenance to the important intangibles of employee relations and community good will, and you are sure to meet code requirements when you specify Schneible.

Why not mail the coupon at the bottom of this page for our Bulletin #554 and more detailed information on the Schneible "SW" Cupola Collector?

SCHNEIBLE

Cable Address: CBSCO
European Licensee: Elex S. A.
Zurich, Switzerland

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Name _____ Title _____
Company _____
Address _____
City _____ Zone ____ State _____

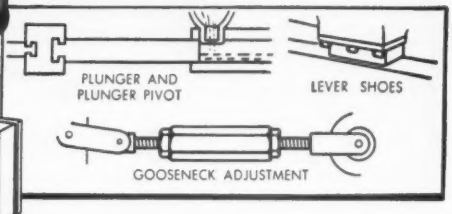
SERVING FOUNDRYMEN THE WORLD OVER

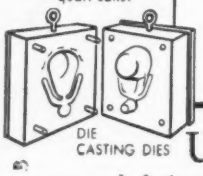
Circle 785 on Inquiry Card—Page 245

HOLD DOWN THOSE DIE CASTING COSTS

In ½, 1-pint and quart cans.

Protect the "hot spots" in your equipment . . . End seizing and galling of die fittings





DIE CASTING DIES

USE Thred-Gard High Temperature Anti-Seize Compound to protect equipment and fittings up to 1200°F. Eliminate production losses and maintenance costs due to heat strain, seizing and galling.

Here's what a drop or two of Thred-Gard will do:

Die casting machines—Reduce down time by insuring continuous, long lasting operation of plunger, plunger pivot, lever shoes and gooseneck adjustment.

Die casting dies—Insure efficient, uninterrupted operation of ejector pins. Prevent thread fracture on screws and hollow head bolts due to seizing and galling—yet, initially, permit them to be drawn to a greater degree of tightness. Save money on your die casting operations. Ask about Thred-Gard. Request a free sample.

Crane Packing Company, 6457 Oakton St., Morton Grove, Illinois. (Chicago Suburb). *In Canada: Crane Packing Co., Ltd., Hamilton, Ont.*

JOHN CRANE **CRANE PACKING COMPANY** 38 YEARS INDUSTRIAL PROGRESS

Circle 786 on Inquiry Card—Page 245

HAUCK PORTABLE GAS TORCHES

for Heating and Drying Ladles

- *No Preheating*
- *Light Instantly*
- *No Clogging*
- *No Carbon*

Burn All Fuel Gases
Operate with Compressed Air
at not less than 40 psi

A heavy duty torch for hard, steady, fast heating ladles, lighting cupolas, drying molds, heating and drying electric furnace linings. Produces any desired flame length. Made in 5 convenient sizes. Also made in oil-burning type. Write for Bulletin 1043C.

HAUCK MANUFACTURING CO.
106 Tenth Street · Brooklyn 15, N. Y.

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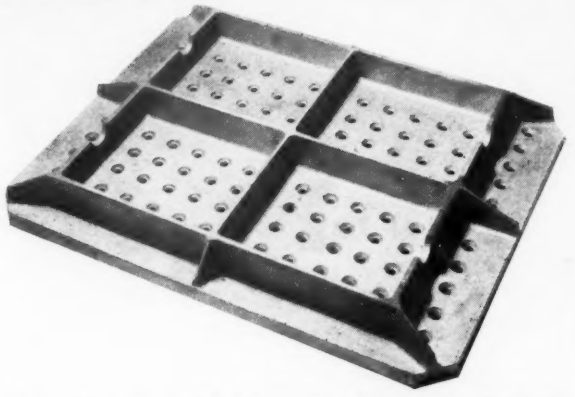
NEW ALUMINUM BOTTOM BOARDS



CUT FOUNDRY COSTS

- Will not warp or burn
- Give long lived service
- Eliminate repairs
- Assure uniform molds each cast
- Not affected by weather
- Eliminate stacking problem
- Raised sand strip (optional) around outer edge peens each mold uniformly and eliminates sand slippage
- Rib reinforced for added strength and durability
- Completely cast of aluminum with vent holes on face to permit gas escapement
- Insures better molds at less cost
- Can be furnished with or without sand strip

Write for prices on standard sizes

JO-EL COMPANY
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Phone ORchard 1-5787

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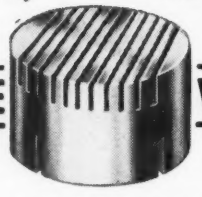
BE PREPARED TO HAVE

BETTER CORES

By Inserting

SMILLIE  **VENTS**

FOR BLOWING CORES

Sizes from ⅛" to 1" in $\frac{1}{16}$" steps — Samples upon request

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Circle 789 on Inquiry Card—Page 245

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MODERNIZATION

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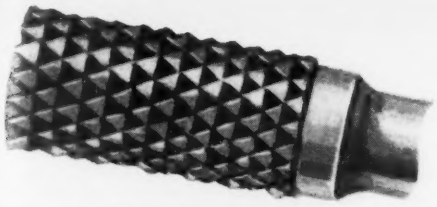


CARBIDE

SOLID and TIPPED CUTTING TOOLS

Stock Tools:

Burrs—Carbide • Drills—Solid Carbide and Tipped • Internal Grinding Burrs—Solid Carbide • Reamers and End Mills—Solid Carbide and Tipped • Slitting Saws—Solid Carbide • Rotary Files H.S.S.—Hand cut and ground from the Solid

Specials:

In addition to the foregoing, ESSEX maintains a special tool designing department and can supply the following in Solid Carbide and Carbide-Tipped Tools:
Tipped Tools • Counterbores • Step-Drills • Twist-Drills • Dies • Grooving and Milling Cutters • Key Cutters • T-Slot Cutters • Router • Bits • Profiling Cutters, Etc. to sketch or blueprint.

Complete resharpening and reconditioning, service available.

Areas available for distributors inquiries invited.

Makers of Fine Tools Since 1868

ESSEX ROTARY FILE & TOOL CORPORATION
295 MADISON AVE. • NEW YORK 17, N. Y.

Circle 791 on Inquiry Card—Page 245

Zircon Sand
Zircon Flour
Silica

BERKSHIRE

Potassium
Titanium
Fluoride

Potassium
Zirconium
Fluoride

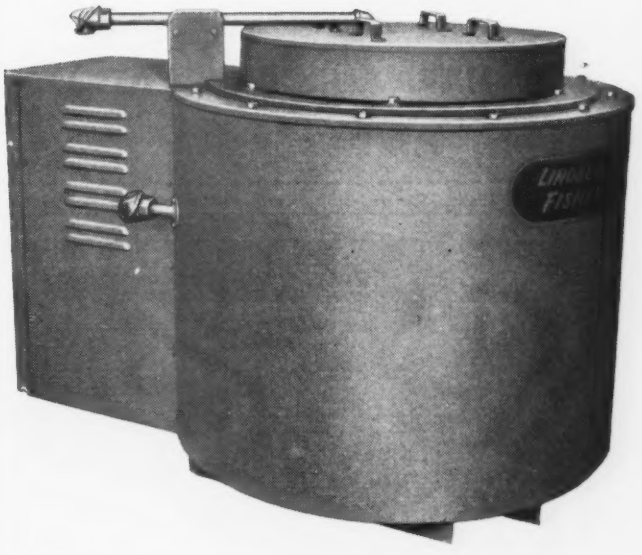
BERKSHIRE CHEMICALS, INC.
420 LEXINGTON AVENUE • NEW YORK 17
55 New Montgomery St. • San Francisco 5, Cal.
Innis Speiden Company Division
New York • Philadelphia • Boston • Cleveland • Chicago

Circle 792 on Inquiry Card—Page 245

New From Lindberg-Fisher

For Permanent Mold and Sand Casting of Aluminum, Magnesium, Zinc and Lead.

A Lindberg-Fisher Electric Resistance Melting Furnace can mean lower cost per lb. of finished casting.



These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

Longer crucible or pot service and low furnace maintenance are obtained with the patented long life, low voltage elements.

Can also be used as a holding furnace on die casting applications.

Write for Bulletin No. 320

LINDBERG FISHER MELTING FURNACES
A Division of Lindberg Engineering Company
2453 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

Circle 793 on Inquiry Card—Page 245

EMPIRE

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

2201 First Ave., North • Birmingham 3, Ala.
Phone: ALpine 1-9135

Circle 794 on Inquiry Card—Page 245

GHW HOT BLAST CUPOLAS

Eliminates fumes and dust

Operates at 930° hot blast with acid lined and 1110° with carbon lining

Offers low cost operation, highest quality castings, and minimum rejects.

E. S. HARMAN CORPORATION
EXCLUSIVE LICENSEE
205 West Wacker Drive Chicago (6) Illinois

Circle 795 on Inquiry Card—Page 245

UNI-WASH DUST COLLECTORS

Compact, complete recirculating Water-Type Dust Collectors for industrial processing dusts. Dirt is collected as wet sludge which may be carried away automatically. No moving parts. Extremely efficient for grinding operations. Eliminates danger of explosion from magnesium and aluminum dust. Proven in foundries. Standard Units available.

For Bulletins and Quotations, write to:

NEWCOMB-DETROIT
5755 RUSSELL ST. • DETROIT 11, MICH.

Circle 796 on Inquiry Card—Page 245

INDICATING CALIPERS

An effective method of taking over-rim measurements of castings, forgings, etc. Stock indicating calipers made in:

2" capacity-graduated in 1/100"
3" " " " 1/64"
50 MM " " " 1/5 MM
75 MM " " " 1/2 MM

Write for descriptive folder with full-size illustrations.

INDICATING CALIPERS CORP.
1359 York Ave., New York 21, N. Y.
Cable address: INDCALIPER Tel. LEhigh 5-0660

Circle 797 on Inquiry Card—Page 245

GLOSSARY OF FOUNDRY TERMS

Compiled by Ed Bremer, FOUNDRY Metallurgical Editor

This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. 48 pages.

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R. W. SIDLEY, INC.

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Circle 798 on Inquiry Card—Page 245

WHAT DO YOU NEED IN A COST METHOD

The simplest and most complete method of costing ever prepared for nonferrous foundries is found in

BASIC COST PRINCIPLES FOR NON-FERROUS FOUNDRIES

(Non-Ferrous Founders' Society Publication)

Up-to-the-minute guide for costing in both small and large foundries. Prepared by practical foundrymen, based on 10 years of research and experience of the industry under Government Pricing Regulations.

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Book Department
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CLASSIFIED ADVERTISING

Help Wanted

SUPERINTENDENT

For world's largest magnesium foundry. Completely mechanized with most modern equipment. Position calls for knowledge of mechanical and jobbing procedures in magnesium sand casting. Remuneration commensurate with qualifications. Company paid benefits. Interviews at your convenience. Reply giving complete details of qualifications and experience.

HOWARD
FOUNDRY COMPANY
1700 NORTH KOSTNER AVENUE
CHICAGO 39, ILLINOIS

FOUNDRY MANAGER

Outstanding opportunity and challenge with long established New England Gray Iron Jobbing Foundry. We are looking for an exceptional man with a record of real accomplishment who is presently employed but looking for a challenging opportunity.

Must be thoroughly familiar with all phases of FOUNDRY operations, capable of managing and expanding our operations.

Our man must be a real leader who can demonstrate his ability to handle all Foundry responsibilities from purchasing to sales.

Reply giving complete details of qualifications, experience and compensation.

Information will be regarded as most confidential.

BOX 217, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

INDUSTRIAL ENGINEER FOR BRASS FOUNDRY

Boston plant of national manufacturing concern has vacancy for man with broad training in nonferrous metallurgy and with at least 3 or 4 year's experience in nonferrous foundry operations.
Must be capable of handling all technical operations in connection with foundry problems.
This is a challenging opportunity with respect to shell molding and other modern foundry processes. Write fully giving details of educational background, experience and salary requirements to:

BOX 250, FOUNDRY
PENTON BLDG. CLEVELAND 13 OHIO

METALLURGISTS

Company engaged in basic process and pyrometallurgy requires several men for production, development and quality control who have some experience in one or more of the following: smelting and refining, steelmaking, or electric furnace operation. Excellent opportunities for qualified men. Hospitalization, insurance and pension plan provided by Company. Plants located midwest, north and south. All replies held strictly confidential. Submit detailed resume. Address: Box 201, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ONE CLEANING ROOM FOREMAN AND ONE MASTER MECHANIC

Central Indiana semi-production gray iron foundry producing castings up to 2 tons requires two men who have the desire and ability to grow with an expanding organization. In your reply give complete qualifications. Address: Box 246, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

Large alloy foundry in Middlewest desires thoroughly experienced Foundry Foreman. Send complete resume. Address: Box 261, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY TECHNICIAN OR QUALITY CONTROL ENGINEERING ASSISTANT

Mechanized gray iron foundry in Ohio producing quality engineering jobbing castings. Applicant should have some technical background, training or experience in one or more of the following fields—Metallurgy, Cupola Control, Sand Control, Gating and Risering.
This position will offer many opportunities in increasing efficiency and control of all foundry operations including practical research, development and application on new foundry processes such as shell process and CO_2 process. Earnings will be dependent on qualifications and ability.

BOX 243, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

GENERAL FOREMAN

To take complete charge of expanding gray iron foundry. Foundry is one of three departments in growing Midwest construction equipment industry which employs approximately 200. Write stating experience in all phases of foundry operations, salary requirement and availability. This is an excellent opportunity for the right man. Address: EAGLE IRON WORKS, 127 HOLCOMB, DES MOINES, IOWA.

ELECTRICIAN—ASSISTANT TO CHIEF

General maintenance of electrical equipment and instruments in steel foundry that employs 650. Applicant must have knowledge of basic electronics, engineering degree preferred but not essential. Foundry experience necessary. Should be familiar with arc furnace, rectifier, type welders, pyrometers and recorder controller instruments. Address: Box 264, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

For Southeastern ductile iron, brass and aluminum foundry. Must have served time as a molder. Prefer between the ages of 25 through 40. Excellent opportunity. Send snap shot and full resume. Address: Box 193, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

MEMO TO ENGINEERS WITH IMAGINATION

U. C. C.

. . . is seeking to fill key development engineering positions in the Newark Development Laboratory of Linde.

Career opportunities for metallurgical and mechanical engineers in the development of new processes and products for foundry operations.

Ideal for the young engineer with a family—near pleasant suburban residential areas with excellent schools—also near urban centers. Congenial work surroundings along with completely modern experimental facilities—liberal Corporation benefits. Please include resume when communicating with Dept. FY

DEVELOPMENT LABORATORY
LINDE AIR PRODUCTS CO.
A Division of
Union Carbide and Carbon Corporation
P.O. Box 819 Newark 1, N. J.

COREROOM SUPERINTENDENT

BY WESTERN MICHIGAN GRAY IRON FOUNDRY. MUST BE FULLY QUALIFIED TO TAKE COMPLETE CHARGE OF ALL COREROOM OPERATIONS. SALARY OPEN. WRITE FULLY GIVING DETAILS OF JOB HISTORY, EXPERIENCE.

BOX 213, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Chicago steel foundry interested in aggressive men, age 30 to 45, with pattern background and experienced in developing molding and core practice. Must be able to work with other people. Future limited only by ability.

BOX 215, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CORE ROOM FOREMAN

For large alloy foundry in Middlewest. Must be thoroughly experienced. Send complete resume. Address: Box 259, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

ASSISTANT FOUNDRY SUPERINTENDENT

We need a man with

—several years experience in methods and techniques of making automotive type castings.

—college education or its equivalent in Metallurgical Engineering.

—practical experience in supervising foundry operations.

If you are looking for a position which provides the opportunity to grow under the direction of one of the country's leading foundrymen while working in one of the largest and most modern equipped foundries in the Northwest, please send your resume to:

MR. R. H. CAMPBELL
MINNEAPOLIS-MOLINE COMPANY
BOX 1050
MINNEAPOLIS 1, MINNESOTA

STEEL FOUNDRY GENERAL FOREMAN

Required by a builder of heavy machinery having large foundry operations in the Montreal area. Output 350 to 700 tons monthly, castings weighing up to 12 tons. Modern foundry. Will be required to assist the superintendent by supervising departmental foreman in the fields of daily operation and handling of working force production, labor and overhead costs. Incentive plan for working force and foreman. Experience in supervising molding and coremaking operations essential. Must be a potential superintendent and able to organize and train personnel.

BOX 222, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGICAL ENGINEER GRADUATE

Middle west commercial steel foundry needs theoretically trained engineer to help keep the organization abreast of technical developments, and to work on quality control programs. Proper applicant will be required to attend all technical society meetings pertaining to steel foundry activities. Address: Box 240, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SAND AND LABORATORY TECHNICIAN

Gray iron foundry in midwest producing castings up to 3000 lbs. has opening for man with good technical background capable of handling sand system and melting department. Good opportunity with a growing foundry. Address: Box 234, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

COREROOM FOREMAN

Good opportunity awaits an experienced core foreman capable of handling coremaking operations in a medium size gray iron foundry. A thorough knowledge of coremaking techniques for all types of jobbing and production work and a good employee relations record are required. Address: Box 236, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

METALLURGICAL RESEARCH ENGINEERS

A wide variety of immediate and future openings exist for capable engineers with backgrounds or interests in any of the following areas of metallurgical endeavor:

Physical and Process Metallurgy
Titanium and Light-Alloy Development
High Temperature Metallurgy
Metals Joining

These openings offer outstanding possiblities for profession recognition and out-of-the ordinary promotional opportunities in a stable, progressive organization which has enjoyed a threefold expansion in the last ten years. For technical application form and literature describing our operations, write to:

TECHNICAL PERSONNEL MANAGER
BATTELLE INSTITUTE
505 KING AVENUE
COLUMBUS 1, OHIO

ENGINEER

A graduate engineer to do supervisory and research work in an expanding shell molding department of a gray iron foundry. Previous experience in shell molding or foundry operations essential. Foundry is a leader in its fields and offers better than average pay and benefits.
A wonderful opportunity for the engineer who is anxious to live in the wholesome environment of a small town with its friendliness, pleasant surroundings, and its proximity to the great out-of-doors.

Please list complete background in first letter, including references and salary desired.

THE BRILLION IRON WORKS, INC.
BRILLION, WISCONSIN

METALLURGIST

Expanding, progressive, integrated steel mill located near St. Louis, Missouri, has opening for metallurgist or metallurgical engineer. Should have minimum of 3 to 5 years' foundry experience. To exercise quality and supervisory control over foundry producing molds and stools and other castings for in-plant use. This is a new department and the position offers outstanding opportunities for personal and professional growth. Salary open. Please submit resume including education, experience and salary requirements.

SUPERINTENDENT OF PERSONNEL
GRANITE CITY STEEL COMPANY
GRANITE CITY, ILLINOIS

INDUSTRIAL ENGINEER

Wonderful opportunity for graduate engineer with foundry experience to assist modernization and cost reduction program in cast iron foundry. Send resume in confidence to:

WILLIAM I. PENTIN
PARKERSBURG RIG & REEL COMPANY
P.O. BOX 1160
PARKERSBURG, WEST VIRGINIA

FOUNDRY SUPERINTENDENT

Semi-mechanized gray iron foundry has an opening for an aggressive foundry superintendent capable of handling all plant operations. A good employee relations record and proven ability to produce high quality castings in a weight range up to 3000 lbs. is essential. Address: Box 235, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

For large alloy foundry in Middlewest. Must be experienced. Send complete resume. Address: Box 260, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

COREROOM FOREMAN
MOLDING FOREMAN
COREMAKERS
MOLDERS

A jobbing and captive foundry specializing in producing large and heavy castings has positions available for Coreroom Foreman, Molding Foreman, Coremakers and Molders. A rapidly expanding concern with excellent opportunities for qualifying applicants. Located in the Upper Peninsula of Michigan. Must have experience producing large and heavy castings. Submit qualifications to:

BOX 224, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Process Engineer covering metallurgical and inspection functions in a Steel Foundry specializing in producing low alloy and carbon steel castings.
Position covers technical control of metal making, sand control, plus testing and inspection functions.
Applicant must have good metallurgical background, coupled with sufficient experience in a steel foundry to qualify.

BOX 200, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MANAGER

Used foundry equipment division of prominent machinery company. To direct sales and advertising. Top salary with unlimited opportunity for advancement. Give complete resume in first letter. Replies confidential. Location Eastern Pennsylvania.
Mail replies to:

BOX 216, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

DESIGNERS-DRAFTSMEN-ENGINEERS

Experienced in foundry layouts and equipment. Send experience record, personal data, recent photo and references prior to personal interview.

BOX 209, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MAINTENANCE SUPERVISOR

Northern Indiana Gray Iron Foundry requires capable maintenance foreman to direct maintenance program and installation of equipment. Must be able to assume responsibility, plan of qualifications and experience, references and work, and supervise men. Please submit resume salary expected. All replies will be kept confidential.

BOX 237, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

GENERAL MANAGER

Small, semi-captive nonferrous jobbing foundry needs man capable of assuming complete management. Present operation is out of date but profitable. If you can prove ability will expand and modernize. Excellent opportunity for qualified, aggressive man looking for a future. Send complete resume with photograph. Address: Box 247, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

RAPIDLY GROWING ENTERPRISE

Needs man capable of running its NONFERROUS FOUNDRY. Must be interested in improving existing methods and facilities and taking advantage of new developments. Should have sound metallurgical background and proven record of practical experience and managerial ability. Address: BOX 257, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

For grinding and finishing department in a progressive midwestern foundry. Must have good employee relations record and be capable of controlling cleaning and grinding operations for quality and high production. Address: Box 233, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PRODUCTION MANAGER

Large alloy foundry in Middlewest desires Production Manager. Must be thoroughly experienced. Send complete resume. Address: Box 258, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

METALLURGIST

Central New England foundry requires the services of technically trained man with gray iron experience. This is a permanent position with an old established company. In reply, give resume of education and experience as well as salary expected.

BOX 242, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

STEEL CASTING INSPECTOR

Well established California steel foundry has a permanent job for a qualified inspector. Must be familiar with Gamma-Ray and Magnaflux process.

BOX 227, FOUNDRY

PENTON BLDG., CLEVELAND 13, OHIO

MOLDING FOREMAN

Experience in all phases of gray iron foundry. Relocate Middle West.

BOX 263, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Maintenance foreman for semi-mechanized foundry. Must be capable of assuming complete charge of department, and setting up a preventative maintenance program. Only man familiar with foundry maintenance need apply. Location: Illinois. Total Employment: 300.

BOX 228, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST OR METALLURGICAL ENGINEER

For work in gray cast iron. B. S. Degree and some melting experience desirable. Duties would involve service and development work on alloys in iron. Moderate travel.

BOX 226, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

ALUMINUM PERMANENT MOLD SUPERINTENDENT

Permanent mold company interested in aggressive, competent superintendent with background of experience in permanent mold and sand. Metallurgical experience preferred, but not necessary. Applicant must know how to handle men and get top production and quality. Foundry employs 50-80 people. Permanent salary. All replies confidential. Address: Box 268, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Midwest company operating large jobbing iron foundry specializing in alloy irons including Ductile wants man for metal and sand control. Ground floor opportunity with sound growing company. Prefer man with foundry background. Address: Box 159, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METHODS ENGINEER

With production and jobbing gray iron foundry experience. Good opportunity for right man in a progressive medium-size gray iron midwestern foundry presently modernizing. Address: Box 232, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Experienced cleaning room foreman. Production gray iron foundry making small castings. Address: Box 253, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

METALLURGIST

Magnesium or aluminum experience in either permanent mold or sand castings desirable. Principally production problems consisting of improving procedure on established jobs and rigging of new work. Some development and research.

WELLMAN BRONZE & ALUMINUM CO.
2325 EAST 93RD STREET
CLEVELAND 4, OHIO

TIME STUDY AND QUALITY CONTROL ENGINEER

Prefer between the ages of 25 through 35. Knowledge of sand laboratory and metallurgy desired but not required. Permanent job in ductile iron foundry in Southeast. Send snap shot and full resume with first letter. Address: Box 191, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

QUALITY CONTROL MAN

Or Foundry Superintendent who knows metallurgy, sand control and pattern gating, to work with foundry supervision in semi-mechanized plant. Salary and bonus. Location: Northern Indiana. Total employment: 90. Address: Box 248, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

ENGINEERING EXECUTIVE

Broad experience in design, development, manufacturing and sales, but recent experience (6 years) specializing in shell molding field. Presently operating on retainer basis but seeking permanent connection with U. S. company. Top compensation expected in return for contributing substantial cost reductions. Principals only.

BOX 241, FOUNDRY
520 N. MICHIGAN AVE. CHICAGO, ILLINOIS

MANAGER OR SUPERINTENDENT

Thirty-five years' practical experience in foundry, molder eighteen years. Have been foreman, superintendent and general manager. Did consultation work in various foundries. One was losing $7,000 per month when I started, in seven months it was making good money. Ran three largest foundries in St. Louis, largest one in Chicago. Understand gray iron, semi-steel, brass, aluminum. Know how to rig jobs to get best production at lowest cost. Understand running of cupola mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 267, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Twenty-six years' experience producing quality castings in plain and alloy gray iron from ½ lb. to 15 tons. Have been foreman, trouble shooter, foundry consultant, metallurgist and superintendent. Have the know-how to produce with minimum costs. Age 52, married. Will relocate. Address: Box 205, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

Twenty years' gray iron foundry supervisory experience, fourteen as cleaning room foreman. Castings twenty lbs. to thirty tons. Jobbing or semi-production shop preferred. Married. Will relocate. Address: Box 265, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERVISOR

Experienced foundry and heavy machinery maintenance. Also managing jobbing machine shops, designing and building special machinery and tools. Technical education. Desire to make change. Write for resume. Address: Box 239, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHIEF INSPECTOR

Thoroughly experienced in all phases of foundry inspection. Also heavy background in customer contact and trouble-shooting. Address: Box 266, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

Twenty-five years' experience in all phases of this work. Ferrous and nonferrous castings. Free to locate anywhere. Address: Box 256, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKS MANAGER-PLANT MANAGER

Thoroughly versed in all phases of ferrous and nonferrous foundry operations. Capable of producing efficiently and profitably. Address: Box 223, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER

Familiar all phases. Excellent background. Desire position with responsibility with progressive concern. Address: Box 225, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

REPRESENTATIVE AVAILABLE

Established sales representative experienced in the manufacture and design of steel castings with clientele of good customers desires steel casting connection for sales in the Cleveland, Ohio area. Address: Box 254, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Available, thorough and practical, green and dry sand molding, coremaking, melting, costs, customer contacts, consulting and advisory work. Good handler of men, along in years. Plenty of know-how. Address: Box 206, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

COREROOM FOREMAN

Well versed in all phases of coreroom operation in ferrous or nonferrous. Production or jobbing coreroom. Good rigger of cores for blowers and production. Good labor relations. Prefer West Coast. Address: Box 231, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER AND METALLURGIST

Presently managing gray iron foundry seeking new affiliation with progressive gray iron or malleable foundry or sales organization. Experience in management, technical, sales and operational phases of gray iron and malleable. Age, 35. Address: Box 252, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Thorough knowledge of all phases of nonferrous metals. Practical man, 36 years' experience, molder, foreman, superintendent, well versed all departments. Available immediately. Address: Box 214, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTING SALESMAN

New Jersey resident. Familiar with sand, shell and investment casting buyers in New Jersey-New York area. Technical background. Address: Box 221, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Large or small castings in gray iron or nonferrous, green or dry sand. 20 years' practical experience in all foundry details. New Jersey preferred. Address: Box 245, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN SHOP SUPERVISOR

Age: mid 30's, married. Seven years' experience handling pattern shops in supervisory capacity. Responsible for all phases of pattern shop operations and production foundry practices. Address: Box 218, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR FOREMAN

Twenty-eight years' practical and technical experience in all phases of operations. Gray iron or nonferrous, jobbing or production. Good trouble shooter. Middle age, married, available immediately anywhere. Address: Box 262, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVES

Michigan, Illinois and Indiana. Successful foundry supply sales experience essential. Profitable, frequent repeat additions to your present lines. Attractive commission. Replies confidentially treated. Write resume of experience and present lines. Address: Box 195, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALESMEN

Resin core binders, water soluble cutting oil. All territories in U.S.A. Compensation: Salary and expenses or straight commission. Address: Box 229, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVE

Plastic core binders, cutting oils. Progressive chemical company. Opens all territories in U.S.A. except Southeast. Address: Box 230, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Foundry Consultant

ELECTRIC FURNACE CONSULTANT
BASIC AND ACID PRACTICE

Supervisor on electric furnaces for 35 years. Thorough knowledge of:

1. All kinds of plain carbon and alloy steel.
2. Analysis control.
3. High standard of physical properties.
4. Low Cost with high productivity.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

Personal

PERSONAL

Ed Markey—Please call St. Louis, Missouri, FR 1-5130.

Wanted-To-Buy

WANTED TO BUY

Tractor Sandslinger, Size 11'—13' with magnetic separator.

Core Ovens—Battery of two, transrack, oil fired recirculating air heating system. Minimum size 14' wide x 15' long x 7' high. Give description, age and conditions.

THE EASTERN FOUNDRY CO.
BOYERTOWN, PA.

WANTED TO BUY

Good used steel flasks in quantities of 25-40.

sizes: 30" - 40" widths
30" - 60" lengths
6" - 10" drags
6" - 20" copes

STERLING CASTING CORPORATION
BLUFFTON, INDIANA

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Foxboro Air Weight Pneumatic Flow Controller with atmospheric compensator for #10 Whiting cupola. Address: Box 238, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Standard twin or single hopper Handy-Sandy. Also standard Reddy-Sandy with 7 or 9 foot centers. Address: Box 251, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Osborn-Roto-Lift Molding Machine, Model 3161. Address: Box 255, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOR SALE
GRAY IRON FOUNDRY
East-Central Ohio

Gray iron foundry suitable for cope and drag, squeezer, floor and bench molding. Gas core ovens. 72" cupola 85,000 square feet on 10 acres. Property fenced. Buildings sprinklered. Plus labor area in agricultural community. Convenient rail facilities.

BOX 244, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 183, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL

$5000-$30,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. BOX 674, MANCHESTER, VERMONT

Foundries Wanted

WANT TO BUY

Interested in buying a small to medium-size foundry producing Niresist, Nihard and similar heat, corrosion and abrasion resistant castings. Please submit complete details in first letter in strict confidence. Address: Box 204, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SMALL BRASS FOUNDRY

On lease basis suitable for faucet and valve castings. Address: CENTRAL BRASS MFG. CO., 2950 EAST 55TH, CLEVELAND 27, OHIO.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and non-ferrous metals and invites inquiries from any country regarding this method and process.

For Sale

OSBORN MOLDING MACHINE

Model #716-PV-6 automatic jolt and squeeze molding machine. Has had very little use and is in excellent condition. Will accept any reasonable offer.

Please phone G. D. Postill, YUkon 5-5111 or write him at:

MUELLER BRASS COMPANY
PORT HURON, MICHIGAN

FOR SALE

EBG-4 "Lancaster" counter-current Rapid Batch mixer complete with hopper, 10 HP gear motor, mixing tools and 4' metal stand. All equipment in good condition and priced to sell. Address: MODERN CRETE MFG. CO. OF DETROIT, 2031-NATIONAL BANK BLDG., DETROIT 26, MICHIGAN.

FOR SALE

Jolt rollover-pattern draw machine #605 Osborn. Completely rebuilt and in first class condition. Address: THE MERIDEN FOUNDRY CO., MERIDEN, CONN.

FOR SALE

No. 4 Whiting Cupola. Price reasonable. Address: JAMESTOWN MALLEABLE IRON CORPORATION, JAMESTOWN, NEW YORK.

FURNACE FOR SALE

Reda #550 oil fired brass melting furnace. Address: CENTRAL BRASS MFG. CO., 2950 EAST 55TH, CLEVELAND 27, OHIO.

FOR SALE

Slightly used Allis-Chalmers 5 KW Foundromatic Dielectric Core Dryer. Address: EMPIRE PATTERN & FOUNDRY COMPANY, P.O. BOX 1647, TULSA, OKLAHOMA. B. R. KINCADE.

For Sale

FOR SALE

MOLDING MACHINES

1—Tabor 22" Power Jolt, Rollover, Draw, Portable, 22" x 32" Table.
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—No. 275 Osborn jolt squeezers. Stationary.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.
1—Porbeck Recirculating, gas fired, double end, thru-drawer type.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—2 HP 20 oz. Spencer Turbine Blowers.
1—Spencer Turbine Blower, 2700 CFM, 27 oz., 30 HP, 3/60/220-440 V.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

3—Jib cranes, 16' swinging beam, 2000# cap.
1—Sly Tumbler 24" x 42".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NDP Royer sand separator.
1—#16 Roto-clone unit complete.
1—15 HP Sullivan Compressor, complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. **CINCINNATI 3, OHIO**

FOR SALE

The following equipment has become surplus due to method changes in our foundry operation. All items listed are in good operating condition.

9—#275 Campbell-Hausfeld tilting furnaces, gas fired.
1—#400 Reda, tilting, reverberatory furnace, gas fired.
2—20 rack, Coleman Tower Ovens, gas fired.
2—Demmler type, 2E hand operated core blowers.
2—Demmler type, 2ED automatic core blowers.

THE SCHAIBLE COMPANY
FOUNDRY DIVISION
2620 COOK STREET
CINCINNATI 14, OHIO

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

We have the best selection of HARD CHROME REBUILT PNEUMATIC TOOLS WE HAVE EVER HAD.

Ingersoll-Rand Size 24 Floor Rammers

Ingersoll-Rand Size 14 Bench Rammers

Cleco Bench Rammers

Chipping Hammers—All types

Core Breakers and Grinders

Our prices are about half the cost of new tools.

All tools sold by us are guaranteed and can be returned if found not satisfactory.

Repair and Rebuilding Service on all Pneumatic Tools

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVE., DAYTON, OHIO
TELEPHONE: MADISON 2701

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P.O. Box 51—Rochester 1, New York

FOR SALE

1—Roots-Connersville Blower 14 x 36, model RCDH, maximum delivery 8000 CFM at 3.5 PSI. Complete with Foxboro control equipment and Burgess-Manning snubber, catalogue #STC-L-16 and Allen Bradley electrical control equipment and 60 HP motor. Purchased new in 1951.

MEECH FOUNDRY, INC.
9906 MEECH AVENUE CLEVELAND 5, OHIO
MICHIGAN 1-5550

FOR SALE

I two ton electric arc furnace, complete, less transformer and panel board. Cheap and quick removal.

BOX 249

PENTON BLDG. CLEVELAND 13 OHIO

FOR SALE

Osborn No. 560 Jolt Pin Lift Molding Machine. Table Size 32" x 45", jolt capacity 2500 lbs. Pattern draw stroke 12". Excellent condition. New price $7275. Selling at a great saving.

STARK FOUNDRY COMPANY
CANTON 5, OHIO
PHONE: GLENDALE 4-5107

FOR SALE

Moulders' Friend Sand Cutter, purchased new March 1953—Motors 220-60-3. Available October 15, 1956.

BLANCHESTER FOUNDRY CO.
BLANCHESTER, OHIO

MOLDING MACHINE

Herman 6000# capacity jolt-roll-draw in operating condition. $2900 FOB POTTSTOWN MACHINE CO., POTTSTOWN, PA. (H. H. Houston) 15% to any established dealer.

For Sale

SAND BLAST EQUIPMENT

BOUGHT	SOLD	TRADED
Pangborn ES-347, 4 wheel, grit blast unit, used for motor heads or motor blocks, good condition $8,000.00 FOB Detroit.		
Pangborn 9' LF Table		$4,000.00
Pangborn 6' Air Table		975.00
Pangborn 1½ cu. ft. Air Barrel		200.00
Pangborn ES-421 Shell Machine		800.00
Pangborn 14GK2 Rocker Barrel		2,500.00
8' American Tablast		1,500.00
6' Plain Wheelabrator Tablast		2,500.00
15" Continuous Wheelabrator		2,000.00
36" Continuous Wheelabrator		6,000.00
27 x 36 Wheelabrator, Rubber or Steel belt		3,000.00
36 x 42 Wheelabrator		3,000.00
42 x 48 Wheelabrator		2,500.00
48 x 48 Wheelabrator		5,000.00
Tumbling Barrels, Horizontal or Vertical		125.00
Vapor Blast Cabinets		600.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure Tanks, Rooms, and additional sand blast equipment too numerous to mention. Write us your desires.

Diamond Sand Blast, Inc.
5654 W. Jefferson
Detroit 9, Mich.
Phone: VI-36750

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
12300	24oz.	Spencer			
8375	20oz.	Spencer	380	16oz.	No. Am.
6000	32oz.	Ing.-Rand	340	20oz.	A-B
4700	32oz.	Ing.-Rand	320	12oz.	Spencer
2500	7oz.	Sturt.	9000	6"SP	Northern
1300	16oz.	Spencer	3420	8"SP	N.Y.
800	13oz.	Buffalo	2700	⅝"SP	Ilg
400	12oz.	Buffalo	2500	½"SP	American
450	7oz.	Spencer	1100	4½"SP	Bayley
400	16oz.	No.Am.	2344	2"SP	Clarage

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

Good Used Steel Flasks

30 Popular Sizes

From 9½" x 15" to 17½" x 21"

Send for list and prices

NEWTON FOUNDRY COMPANY
NEWTON, IOWA

FOR SALE

1—48 x 48 Heavy Duty American Wheelabrator Tumblast capable of handling castings up to and including 250 lbs. including complete electrical equipment for 440 volt, 60 cycle, 3 phase current. Serial #A-25079.

1—American Tumblast Loader complete with electrical equipment for 440 volt, 60 cycle, 3 phase current.

BOX 197, FOUNDRY
PENTON BLDG. CLEVELAND 13. OHIO

FOR SALE

One #6 Whiting Cupola purchased new in 1942 complete with Whiting Skip Hoist Charger. Available for inspection.

THE FOREST CITY FOUNDRIES CO.
CLEVELAND 13, OHIO

FOR SALE

1—Simpson Mixer, #2, 20 HP motor.
Miscellaneous: Screens, Pulverizers, Grinders, Tyler Rotap Screens etc.
Wanted: Your Idle Machinery.
OUR 39th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N. Y. TEL. BA. 7-0600

For Sale

FOR SALE

JOLT SQUEEZE STRIP MOLDING MACHINES	
Nichols—Type B; 14" cyl. 14" x 36"	$250.00
#211 SPO	550.00
#213 SPO—19 x 26; 4½" jolt cyl.; 13" sq.	750.00
#2114 SPO—14 x 24; 11" sq. cyl.	650.00
#2136 SPO—13" sq. cyl.	750.00
#720 U Osborn—31 x 44; 11" sq. cyl.	550.00
JOLT ROLLOVER MOLDING MACHINES	
#918 Johnston & Jennings—44" x 54"; 18" draw; no pit required	1250.00
Tabor 30" x 40"; extends to 69"; 12" draw, shockless type; 1000 lb cap.	950.00
#2047-4 Osborn, 18" x 24"; stationary; 1942	275.00
#601 Osborn; 750 lb. cap.; 30" flask	350.00
#602 Osborn; 750 lb. cap; 36" flask	450.00
#605 Osborn; 750 lb. cap; 54" flask	650.00
JOLT STRIP MOLDING MACHINE	
#559 Osborn—25 x 30; 1200 lb. cap.	550.00
JOLT SQUEEZERS	
Nicholls—Type D	250.00
Osborn—#275 J 16 x 20; 10" sq. cyl.	275.00
Osborn—#276 J	350.00
PUSH OFF MACHINES	
Champion—Model LLA-45; 45 x 26" used with sandslinger	350.00
International; Model LP-Portable Pin Lift; 30 x 40 used with sandslinger	350.00
CORE BLOWERS—CORE ROLLOVERS	
#193 Osborn—for med. cores	650.00
#94 Osborn—for large cores	750.00
Osborn Hand Rollovers—Model 42	100.00
#4 Demmler Core Blowers each	650.00
MATERIAL HANDLING EQUIPMENT	
Model HA Hough Payloader	1000.00
Clark Fork Lift Truck—6000 lb	1000.00
Elwell Parker Fork Lift Truck—4000 lb	1000.00
Mercury Fork Lift Truck—2000 lb. Elec.	1000.00
Lewis-Shepard Platform Lift Trucks	150.00
FURNACES	
Stroman—2000 lb. Tilting Hydraulic	1500.00
Fisher—2000# Aluminum	2000.00
CORE OVENS	
Dielectric—Model 900A and 1800A. Set up in your shop in operating condition. Less than ½ new price	12,000.00
MISCELLANEOUS FOUNDRY EQUIPMENT	
350 lb. Detroit Rocker Barrel Furnace Complete	2500.00
U. S. 7½ H.P. 3 speed grinder; 28" wheel	450.00
Model S B & P Screenerator	225.00
Royer Screenerator	250.00
Climax Wire Straightener	400.00
Model AA American Sandcutter	750.00

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOUNDRY MACHINERY AND EQUIPMENT
BOUGHT AND SOLD

One piece or a complete foundry

Prompt Action

Muellers—Rollovers—

Squeezers—Slingers

Flasks—Blowers—Grinders

Wheelabrators etc.

HOMAN MACHINERY COMPANY
824 REEDY ST.

CINCINNATI 2, OHIO
MAIN 1-4634

LIQUIDATION SALE

ONE OF AMERICA'S MOST MODERN AND MECHANIZED PIPE FITTING FOUNDRIES

AIR COMPRESSORS

2—INGERSOLL RAND Single Stage Horizontal water cooled Air Compressors, with G.E. 30 HP Motors and Controls.

2—AMERICAN Single Stage Air Compressors, Horizontal, water cooled, with G.E. 25 HP Motors and Controls.

CORE ROOM EQUIPMENT

1—Core Room Sand System, consisting of:
- 1—B & P #40 Speedmuller, with Bucket Loader.
- 2—JEFFREY 25-ton cap. Sand Storage Hoppers.
- 1—JEFFREY 40' Bucket Elevator, 72 buckets, 10 HP Motor & Reducer.
- 1—JEFFREY Distributing Belt, 24" wide x 40' long, with Plows, distributing sand to 6 steel chutes.

1—GEHNRICH Horizontal Mechanized Core Oven, oil fired, chain drive, consisting of 119 trays, 4 shelves per tray.

2—OSBORN #92 Core Blowers.

1—OSBORN #91 Core Blower.

3—CHAMPION Bench Type CB-5 Core Blowers.

1—REDFORD #1 Bench Type Core Blower.

1000 Steel Tote Boxes for small cores.

2—OSBORN #42 Core Rollovers.

1—INTERNATIONAL Type HJ Power Rollover, power jolt, foot draw Core machine.

CLEANING EQUIPMENT

1—AMERICAN WHEELABRATOR 48" x 42" Tumblast, with Bucket Loader.

1—PANGBORN Model 9-LG-14 Table Blast Machine, (4) 48" dia. auxiliary tables.

6—CINCINNATI and U.S. ELECTRICAL Snagging Grinders, from 5 HP to 15 HP Motors, wheel sizes up to 24" x 3", single and multiple speed machines.

7—SLY Tumbling Barrels, 36" dia. x 60" and 72" long, complete with direct connected motors and reducers, with controls.

1—PANGBORN Model EN-2 Sand Blast Cabinet, complete for small parts.

2—Abrasive Cut-off Machines, with 3 HP Motors.

2—SLY 24" x 48" Tumbling Barrels, with 5 HP motors.

MELTING EQUIPMENT

2—WHITING No. 7 Cupolas, 72" dia., with Whiting Skip Hoist Chargers and bottom drop cone buckets.

2—WHITING Worm Gear 4000 lb. capacity Mixing Ladles.

2—INGERSOLL RAND Centrifugal Cupola Blowers, with 40 HP Motors and Air Weight Controllers.

10—Ladles and Pouring Devices, various sizes and capacities.

2—HOWE Weighing Scales for charging Skip Hoists for Cupolas. Installation new 1948.

MACHINE SHOP EQUIPMENT

1—NILES Planer, 54" x 10' bed, with 25 HP Motor direct connected, with generator and controls.

1—F. E. REED Engine Lathe.

3—WALKER-TURNER Drill Presses.

1—GOULD & EBERHART V-ram Shaper.

1—LeBLOUND Tool Grinder.

1—BROWN & SHARPE #2 Milling Machine.

6—HOBART & LINCOLN 300 and 400 amp. Electric Welders.

DUST COLLECTORS

2—PANGBORN Bag Type Dust Collectors, with 30 HP Motors.

1—AMERICAN Bag Type Dust Collector, with 25 HP Motor.

2—AMERICAN AIR FILTER No. 30 Wet Type Roto-Clones, with sludge ejectors Type W, Arrangement C.

PATTERN SHOP EQUIPMENT

1—DELTA 12" Disc Sander.

1—GENERAL ELECTRIC Surface Sander.

1—WALKER TURNER Circular Saw.

1—DELTA Circular Saw.

1—RACINE Band Saw.

1—DELTA Jig Saw.

1—ELECTRICAL SPECIALTY CO. Joiner.

1—WALKER TURNER Tool Grinder.

1—PEERLESS Speed Lathe.

1—LIMA-FAY & SCOTT Lathe.

1—WALKER TURNER Cross-Cut Saw.

3—WALKER TURNER Drill Presses.

MOLDING MACHINES

12—OSBORN #275 Jolt Squeezers, portable.

5—OSBORN #276-J Jolt Squeezers.

4—OSBORN #712-PJ Jolt Squeeze Pin Lift Machines.

2—OSBORN #42 Core Rollover Machines.

4—OSBORN #210 Jolt Squeezers.

4—OSBORN #212-PJ Jolt Squeezers.

3—SPO #113 Jolt Squeezers.

5—SPO #2136-G Jolt Squeeze Pin Lift Machines.

2—TABOR 30 x 40 Jolt Rollover Pattern Draw Machines.

4—TABOR Jolt Squeeze Pin Lift Machines.

1—OSBORN #442 Jolt Rollover Pattern Draw Mach.

1—JOHNSON & JENNINGS #2 Jolt Squeeze Pin Lift Machine, 16" squeeze cylinder.

3—MILWAUKEE #104 Jolt Squeezers.

MATERIAL HANDLING EQUIPMENT

3—YALE & TOWNE 3-ton capacity Platform High Lift Trucks, with exide 15 cell batteries.

2—SHEPARD NILES 2 and 3-ton capacities Electric Hoists.

14—YALE & TOWNE and WRIGHT Chain Falls, from 1-ton to 5-ton capacities.

50—ROURA ½ yd. and ¾ yd. Front Tilting Dump Buckets.

350 Skids and Stacking Tote Boxes.

2—EMNC Electric Magnets, 39" and 42" dia.

MISCELLANEOUS

9—Man Cooling Fans.

800' Rubber Belt Conveyor.

27—Speed Reducers.

102 Motors, various HP's.

250 Vibrators, various sizes.

20 Tons of Mold Weights.

Wheelbarrows, Core Racks, Shovels, Hand Rammers, etc.

LIQUIDATION OF OUR FOUNDRY DIVISION ONLY

OUR REPRESENTATIVE IS ON THE PREMISES FOR DAILY INSPECTIONS

WRITE—WIRE—PHONE COLLECT.

IMMEDIATE DELIVERY

SCALES

2—FAIRBANKS MORSE Open Face Dial Type Platform Scales, 48" x 48" and 48" x 60" platforms, 4000 lb. and 6250 lb. capacities.

FLASKS

40—HINES Pop-off Flasks, various sizes.

1200 STERLING Steel Flasks, sizes from 12" x 12" to 30" x 36".

SAND MULLERS

1—BEARDSLEY & PIPER #30 Speedmuller, complete with Bucket Loader, 25 HP Motor and Controls.

30—STATION SAND SYSTEM, CONSISTING OF:
- 1—B & P #70 Air Cooled Muller, with 100 HP Motor.
- 2—JEFFREY Bucket Elevators.
- 1—JEFFREY 24" x 130' Distributing Belt Conveyor, with 30 Moulders Hoppers and Plows.
- 1—JEFFREY Sand Screen.
- 1—JEFFREY 50-ton cap. Storage Bin, with Bond Hopper.
- 1—JEFFREY 24" x 30' Crossover Belt.
- 1—JEFFREY 24" x 25' Return Sand Belt Conveyor, with Dings Magnetic Pulley.
- 2—HEWITT-ROBBINS 4' x 6' Spring Mounted Shakeouts, 8000 lb. rated capacity.
- 2—JEFFREY Mold Car Conveyors, 297' of chain, 66 cars, car tops 24" wide by 48" long, complete with drive unit.

20—STATION SAND SYSTEM
Same as above with exception that distributing belt is only 90' long and delivers sand to a cross-over belt feeding a B & P 5-ton Plate Feeder and a B & P Swing Slinger, 19" head, 4" tip. Aside from this, the system is complete with the same equipment as the above. THESE UNITS WILL BE OFFERED BOTH AS COMPLETE SYSTEMS OR BROKEN UP AS TO INDIVIDUAL PIECES.

STEEL APRON CONVEYOR

3—JEFFREY Steel Apron Conveyors, 24", 30" and 36" widths, up to 60' in length, for sorting and conveying hot castings.

PIPE TAPPING MACHINES—$250,000 Replacement Value.

Pottstown:

No.	Size	Machine	Heads	HP Motor
1	1¼"	2 in 1 pan	6	15
2	1¼"	1 in pan	3	7½
1	¾"	2 in 1 pan	6	15
1	2"	3 in 1 pan	8	20
4	2"	1 pan	3	10
1	4"	2 in 1 pan	6	20

Baker:

2	4"	1 pan	1	15
1	Multi-Size	1 pan	1	5
1	Multi-Size	3 in 1 pan	3	10 and ½ HP Water Pump

Essex:

1	3"	3 in 1 pan	9	25 2 HP Pump ¾ HP Convey.
1	3"	3 in 1 pan	9	25 ½ HP Pump 1 HP Conveyor
1	2"	6 in 1 pan	17	25 ¾ HP Pump 1 HP Conveyor
1	2"	6 in 1 pan	17	25 1 HP Pump ¾ HP Convey.
1	1"	8 in 1 pan	22	10
1	1¼"	8 in 1 pan	22	10

NATIONAL FOUNDRY COMPANY OF NEW YORK

10 SANDFORD ST. **ULSTER 2-8200** **BROOKLYN 5, NEW YORK**

THE ACME BARGAIN PAGE

AIR COMPRESSORS
Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. Rebuilt 1952.

BLOWERS
Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

CONVEYORS, VIBRATING
Os-A-Veyor 2—24″ x 24″ section with 6′ grizzley

CORE BLOWERS
3—International SB 12.
4—International SB 13.
10—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
2—CB 10 Late Type.

CORE GRINDERS
4—Milwaukee 70-9.

CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS
2—Coleman Gas Fired 28′-25″ x 42″ opening.

CRANES
2—Northern 5 ton 40′ span, 22′ lift, 220 V. A.C.
1—Whiting 5 ton 40′ span, 22′ lift, 220 V. A.C.

ELECTRIC MELTING FURNACES
Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.

FURNACE TRANSFORMERS
We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

GRINDERS
Horizontal Disc (Flat) Grinders:
Gardner #186, 30″ dia. disc. 10 HP, 220/440V, with dresser, wet or dry grinder.
Double End Disc:
1—U.S. 18″ wheels, 2 swing tables.

GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20″ dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME
2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

MOLDING MACHINES
Jolt Squeezers:
5—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.
10—Osborn 275J.

Jolt Squeeze Pin Lifts BIG
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw. Portable.
2—#165 Milwaukees.

ROLLOVERS
1—Herman 4000# Series 30″ x 60″ table.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.
3—Spo Model 9032.
1—Milwaukee 217.
2—International Type G, Portable, 20″ x 8″ draw.
3—Tabor Portable Rollover 30″.
Johnson & Jennings 1020-44 x 44 max. Flask Size.

PIN LIFT PUSHOFFS
1—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

3 No. 2 Simpson Mullers UD, 2 New 1952 with skips

OVENS, CORE
Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.

OVERHEAD TROLLEY CONVEYORS
5000′ Jervis B. Webb & Link Belt 658 chain, 4 D.C. motor drive and MG set.

PREPARATOR
1—B & P #70

POURING DEVICES
3—Pouring devices, Whiting 500#.

SAND SLINGERS
B & P Motive Jr. Slinger 19″ 2 speed head
B & P Tractor type 13′

SANDBELT CONVEYORS
144′-30″ Flat with Drives.
47′-30″ Trough with Drives.

TUMBLING BARRELS
3—Royersford 42′ x 72′ Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42″ Dia. x 56″.

WIRE STRAIGHTENERS
American type F Rod Straightener
Lewis 2C ⅛ to ¼″ cap.
Climax 2A

WHEELABRATORS
1—27″ x 36″ Rubber Belt Wheelabrator

ACME

ACME EQUIPMENT CO., INC.
We will buy for cash a single piece of equipment or your entire plant
126 South Clinton Street • *Phone:* ANdover 3-3430 • Chicago 6, Illinois

MONA

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—CHICAGO-PNEUMATIC Size 7½ x 6 Single Stage horizontal, 20 HP Motor, Starter etc, 220/440 volts.
4—GARDNER-DENVER Model ADR, 4" stroke, 15 HP Motor & electrical 220/-440/3/60 cycles 125 PSI pressure, w/-storage tanks. New in 1950's.
1—SULLIVAN Type WN-3 size 20" x 12" x 14", 1220 CFM, 250 HP, AC Motor.

AIR HOISTS

1—INGERSOLL-RAND, Size C 2000 lb.
75—INGERSOLL RAND RC-5, 500 lbs.
10—INGERSOLL RAND LC-7, 700 lbs.
3—INGERSOLL RAND Size "AN" 500 lbs.
6—INGERSOLL RAND Size "BN" 1000.
1—INGERSOLL-RAND Size "D", 4,000 lbs.
1—INGERSOLL-RAND Size "E", 10,000.
15—DETROIT, 1 and 2 ton cap.
15—APPLETON air hose reels, swivel base, 50', and 75 capacities.

ELECTRIC HOISTS

1—Comet 1000 lbs. capacity.
1—SHAW Box 1000 lbs. capacity.

BUCKET ELEVATORS

1—LINK BELT 30' Centers, 10" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 35' Centers, 12" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 50' Centers, 16" x 8" Buckets, w/Motor and Drive.

CUT-OFF MACHINES

1—DEWALT model ME2 cut-off saw, 10 HP motor, 24" Carboloy blades.
1—TABOR model C10AF, Abrasive Disc, 16" Wheel, 10 H.P. Motor.
1—GROB Band Saw, Type OS-36, open end, 36" throat. MD.
3—TESSMER "I" Sprue Cutters.

CORE WIRE AND ROD STRAIGHTENERS

1—AMERICAN Type D Pneumatic Rod Straightener and Shear. 1¼" capacity.
1—CLIMAX #3, ¼" to ⅝", Length 10".

CORE GRINDERS

2—MILWAUKEE Rotary Type, Model 70-12. 70" Dia. Table. Very Late.
1—STONEY core grinder, 16" dia. wheel, 48" travel, 5 HP AC motor.

CORE BLOWERS

2—CHAMPIONS CB 10, Max. Core 10 lbs.
2—CHAMPIONS CB 400, Max. Core 300.
1—DEMMLER No. 1, Max. Core 10 lbs.
2—DEMMLER No. 2K, Max. Core 20 lbs.
2—DEMMLER No. 2E, Max. Core 20 lbs.
2—DEMMLER No. 2, Max. Core 20 lbs.
2—DEMMLER No. 3, Max. Core 35 lbs.
2—DEMMLER No. 3K, Max. Core 35 lbs.
2—DEMMLER No. 3E, Max. Core 35 lbs.
1—DEMMLER No. 4, Max. Core 100 lbs.
1—DEMMLER No. 4E, Max Core 100 lbs.
2—INTERNATIONALS No. SB, 11 Max. Core 15 lbs.
2—INTERNATIONALS No. SB 13, Max. Core 30 lbs.
2—OSBORN No. 92, Max. Core 35 lbs.
2—OSBORN No. 192, Max. Core 50 lbs.
2—OSBORN No. 193, Max. Core 75 lbs.
6—MILWAUKEE TACCONE Model A-3, Max. Core, 4 lbs.

CORE KNOCKOUT SYSTEM

Consisting of: Simplicity 3' x 8' Shakeout, 24" x 60' Belt beneath Shakeout, Inclined Belt 24" x 105' with 18" x 24" Dings Magnetic Pulley & MG Set, Jeffrey 24" x 20" Double Roll Crusher, & 25 Ton Capacity Storage Bin.

CORE OVENS

1—COLEMAN Car Type Mold Oven 15'W x 8'H x 20'L Gas & Oil Combination Burners, Re-Circulating, with all controls.
1—COLEMAN Model #1 Jr. Gas Fired Portable Core Oven, drawer type, 5 drawers, 3 burners, with controls.
1—INDUCTION Heating Dialectric Model M-800A. 600 lbs. per Hr. New.
1—INDUSTRIAL "Revolving Carriers" Continuous, Trays 18" x 80", Gas Fired.
1—YOUNG BROS. 2-Comp. 10 Drawers, Overall 9' x 12' x 8', Gas Fired.
1—MAEHLER SINGLE COMPARTMENT I.D. 96" L x 80" W x 84" High, Gas Fired Recirculating, L & N Controls.
2—DIETERT #500 LAB DRYING TYPE.

CUPOLAS, BLOWERS & ACCESSORIES

1—WHITING No. 6 Cupola, with Loader, Controller, Motor and Blower.
1—WHITING No. 3½ Cupola, with Loader, and Blower. NEW 1953.
1—ROOTS CONNERSVILLE, Size 20 x 44, 7000 CFM, Type HD, 50 HP Motor.
4—LINDBERG Centrifugal Blowers 2100 CFM, with 15 HP Motors.
1—BASIC REFRACTORIES BRI Gun, Model 110. For cupola lining.
5—WHITING 42" Dia. Charging Buckets.
1—CUPOLA Bondactor. For lining.
1—I & R Single Stage FS-367, 100 HP, 9400 CFM.
2—WHITING No. 9 Cupolas with I & R FS-357 Blowers 50 HP, NEW 1944.
2—I & R Type FS 365 Turbo-Blowers, 50 HP, 8150CFM.
1—WHITING 150 HP Centrifugal Blower, 12,800 CFM with Foxboro Air Weight Controller.

DUST COLLECTORS & ROTO-CLONES

1—AMERICAN AIR FILTER No. 20, Type N Rotoclone Dust Collectr, Arrangement C, with sludge ejector.
1—AMERICAN Air Filter No. 12, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 14, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 27, Type W, arrangement "C," with Sludge Ejector.
2—AMERICAN Air Filter Type N, Size 10 with Bench. For Grinding.
1—AMERICAN Air Filter Type N, Size 24, 24,000 CFM, 75 HP Motor.
3—AMERICAN AIR FILTER Type W, Size 30, Arrangement "C," with Sludge Ejector.

ELECTRIC ARC MELTING

2—AJAX #500 Nose Tilt Furnaces, 3000 cycle. Used with Induction MG Set.
1—AJAX #300 Nose Tilt Furnaces, 3000 cycle. Used with Induction MG Set.
2—DETROIT Rockers, Indirect Arc. Type AA, 750-1000 lbs. capacity. Complete with 200 KVA Transformers. Control Panels, Automatic Electrode Holders.
2—DETROIT Rockers, Indirect Arc, Type AA, 1000-1500 lbs. capacity. Complete with 358 KVA Transformers. Control Panels, Automatic Electrode Holders.

GAS & OIL FIRED FURNACES

2—LINDBERG-FISHER Model MNP, Size 300, electric tilt, with motor and blower.
6—LINDBERG FISHER Model MNP, Size 1700, Electric Tilt, Motor & Blower.
3—LINDBERG FISHER Model MNP, Size 2400, Electric Tilt, Motor & Blower.
2—LINDBERG FISHER Type BB1, Size 25, Hand Tilt, with Motor & Blower.
12—LINDBERG FISHER, Model SSH, Size 550, Stationary, Motor & Blower.
6—LINDBERG FISHER, Model SSH, Size 150 Stationary, Motor & Blower.
3—LINDBERG FISHER, Model SSH, Size 60, Stationary, Motor & Blower.
10—CAMPBELL HAUSFIELD, Stationary, Size 125 to 250 Motor & Blower.
2—CAMPBELL HAUSFIELD Model 1PNT, Size 2000 lbs., Electric Tilt, with Motor & Blower.

GRINDERS—SWING FRAME

1—MARSHKE, 12" x 2", 3 HP.
1—MARSHKE, 20" x 10", 10 H.P.
2—FOX No. 6, 24" x 10", 15 H.P.
1—MARSHKE 24" x 10", 15 HP motor.

GRINDERS—SNAGGING

2—U. S. ELECTRICAL, No. 64, 14" x 3" Wheel, 7½ HP, 4-Speeds.
1—HAMMOND, Model WR-1, 24" x 3" x 12" Wheel, 10 HP.
2—SAFETY RITES, No. 174, 24" x 3" x 12", 10 HP.
2—MARSHKE Model LGZAH 24" x 4" x 12" Wheel, Double End 20 HP Multiple

GRINDERS—DISC

1—BEASLEY #372 Vertical Spindle Dry Grinder, 53" dia., 20 HP. New 1952.
1—QUEEN CITY, Model 100 Double End, wheel size 20" x 2" x 2", with 10 HP
1—U. S. ELECTRIC, No. 80, Double End, Wheel size 16" x 3", with 7½ HP Motor.

HEAT TREAT FURNACE

2—LINDBERG, Model 4860 GH, Gas Fired 48" x 60", Recirculating, with L & N Controls to 1250° F.
1—LOFTUS ENGINEERING CORP. Annealing, Walking Beam Type, Gas Fired, 1600°, Recirculating, 10' x 12' x 40'.
1—AJAX MFG. Electric. ID 54' Long, 46" Wide, 36" High, 800°. Single Phase.

LADLES

12—MODERN pouring devices, Models F-9 and FA-9, with tapered covered ladles. 400 to 800 lbs. capacity.
3—WHITING Cylindrical, 275 lbs. 19" x 26".
2—MODERN Cylindrical, 1500# 29" x 30".
1—MODERN mixing, 44" x 44", on wheels. 4000 lbs.
2—STEVENS Cylindrical, 2450 lbs. 29½" x 41½".
9—WHITING Lip Pour, 1200 lbs., 23" x 23".
6—MODERN Lip Pour, 1600 lbs. 24" x 24".
2—WHITING Lip Pour, 2000 lbs. 29" x 29".
2—WHITING Lip Pour, 7000 lbs., 41" x 41".
1—WHITING Lip Pour, 8000 lbs., 44" x 48".
2—WHITING Lip Pour, 10 ton 62" x 62".
1—WHITING teapot, 4000 lbs., 32" x 32".
1—WHITING Lip Pour, 40 ton capacity.
7—WHITING Bottom Pour 48" x 48", 4 Ton Cap.
1—WHITING Lip Pour 7 Ton Capacity.
1—MODERN 3 Ton Cylindrical Mixing Type, Electric.

MOLDING MACHINES JOLT SQUEEZERS

2—MILWAUKEE No. 104, 10" cyl., portable.
2—MILWAUKEE No. 123, 12" cyl., stationary.
6—MILWAUKEE No. 181, 18" squeeze cyl. 24" x 36" table.
8—OSBORN No. 275 JW, Straddle Type, 10" Cyl., Portable.
16—OSBORN No. 275J, 10" Cyl., Portable.
3—OSBORN No. 276J, 12" Cyl., Portable.
6—OSBORN No. 210 PJ, Swing Back Head, 10" Cyl., Stationary.
6—OSBORN No. 212 PJ, Swing Back Head, 12" Cyl., Stationary.
1—CHAMPION No. JS-10-P, 10" Cyl., Swing Back Head, Portable.
20—SPO No. 110J, 10" Cyl., Portable.
6—TABOR 10" cyl. portable and stationary

JOLT ROLLOVER PATTERN DRAW

1—DAVENPORT model 24SA, 24" x 30" table. 12" draw, 1200 lbs. capacity.
1—DAVENPORT No. 28 SA, 29" x 40" table, 1500 lbs. cap., 12" draw.
1—DAVENPORT No. 34 SA, 34" x 48" table. 2500 lbs. cap., 15" draw.
1—DAVENPORT No. 28R, 34" x 48" Table, 12" Draw.
1—DAVENPORT No. 40-SA, 42" x 50" Table, 3000 lbs. Jolt, 18" Draw.
1—HERMAN #6000 Series, 42" x 78" Table, 6000 lbs. Jolt Cap., 20" Draw.
1—HERMAN #1500 Series, Table 26" x 30", Jolt 1500 lbs.
1—HERMAN 10,000 Series 54" x 108" Table, 20" cyl. 10,000# Jolt.
2—HERMAN Hi-Speed Jar, 1500 lb. series, 26" x 48" table.
1—HERMAN #750 Series, Table 20" x 30", 750 lbs. Jolt.
2—HERMAN #4000 series, 40" x 60" table, 13" jolt cyl.; 4000 lbs. cap.
6—INTERNATIONAL "R" Core Rollovers.
1—INTERNATIONAL "G" Size 20" x 8".
1—INTERNATIONAL "G" Size 24" x 10".
1—INTERNATIONAL "G" Size 30" x 12".
1—INTERNATIONAL RES. Size 15" x 8".
1—INTERNATIONAL Type "F" 31" x 54". Draw 16". Jolt Cap. 2500 lbs.
4—JOHNSTON & JENNINGS model 918, 44" x 54" table, 20" draw, 2000 lbs. cap.

WRITE FOR OUR COMPLETELY NEW CATALOG OF USED FOUNDRY EQUIPMENT.

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over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

1—JOHNSTON & JENNINGS 815-B table 30" x 40", draw 15", jolt 1500 lbs.
1—MILWAUKEE #167, Table 32" x 33", Draw 12", Jolt 1000 lbs., Sq. Cyl. 16".
1—MILWAUKEE 217 table 35" x 41", sq. cyl. 16", draw 12", jolt 1200 lbs.
1—MILWAUKEE Model 60B-3, 60" flask, 18" draw.
10—OSBORN No. 40 and 42, Hand Core Rollovers, 18" x 8" Draw.
1—OSBORN No. 342, Table 23" x 38", Draw 10", Jolt 1000 lbs.
1—OSBORN No. 442, Table 21" x 31", Draw 10", Jolt 600 lbs.
1—OSBORN No. 242W, Table 29" x 42", Draw 19", Jolt 1500 lbs.
2—OSBORN No. 405, Table 57" x 64", Draw 26", Jolt 3000 lbs.
6—OSBORN No. 601, 30" wide Flask, 10" Draw, 750 lbs. Jolt.
6—OSBORN No. 602, 36" Wide Flask, 10" Draw, 750 lbs. Jolt.
2—OSBORN No. 332, Flask Size 26" x 36", Draw 9", Sq. Cyl. 16", 1500 lbs. Jolt.
1—SPO No. 413D, Table 24" x 25", Draw 10", Jolt 600 lbs., Sq. Cyl. 13".
1—SPO model 506, portable, 24" x 30" table, 10" draw, 600 lbs. capacity.
3—TABOR, Size 30" x 40" Table 12" Draw 1000 lbs. Jolt Cap. Stationary.
4—TABOR, Size 22" x 32", Draw 10", Jolt 600 lbs.

JOLT PIN LIFT

2—DAVENPORT model 24 AJS, 24" x 30" table, 8" draw, 1000 lbs. capacity.
1—DAVENPORT No. 40 AJS, Table 44" x 54", Jolt 4000 lbs., Draw 18".
2—MILWAUKEE Model 2542, 38" x 42" table, 12" draw, 3000 lbs., jolt cap.
2—OSBORN No. 559, Table 25" x 30", Draw 6", Jolt 1200 lbs.
1—OSBORN No. 563, Table 55" x 63", Draw 12", Jolt 7000 lbs.
1—SPO model 307, 24" x 30" table, 8" draw, 1000 lbs. capacity. Portable.
1—J & J 68SP, 24" x 30" table, 6" draw, 1000# Jolt.

PIN LIFT

1—INTERNATIONAL Model LP 6, 8" draw, 750 lbs. cap.
1—INTERNATIONAL LP 10, 30" x 30" flask, 1000 lbs. cap.
2—MILWAUKEE No. 620 ND, 24" x 30" table, 2000 lbs. cap.

JOLT SQUEEZE PIN LIFT

1—INTERNATIONAL PKL, 12" Squeeze Cyl., 6" Draw.
1—MILWAUKEE No. 163, Table 15" x 24", Draw 8", Jolt 1500 lbs., Squeeze Cyl. 16".
2—OSBORN No. 710J Table 17" x 21", Squeeze Cyl. 10".
1—SPO 2114, table 20" x 27", 4" draw, 600 lbs. jolt, 11" cyl.
1—SPO 2146, table 21" x 31", 6" draw, 14" cylinder, portable.
1—SPO 2136G, table 19" x 26", 6" draw, 13" cyl. portable.

JOLT (BUMPERS)

2—FEDERAL Bumpers, 24" x 36" table.
1—DAVENPORT, model AJS, 20" x 30" table, 1000 lbs. cap.
1—HERMAN, 40" x 60" Table, 13" Cyl. 6000 lbs. Jolt.
1—TABOR, Table 30" x 40", 2800# cap.
1—HERMAN 8' x 12' Table, 20" Cyl, 10,000# Jolt.

MATERIAL HANDLING EQUIPMENT

1—BLAW-KNOX ½ yard clamshell bucket, single line.
1—INGERSOLL RAND, Size MHU, Air W'nch, 2000 lbs. Cap.
6—LEWIS SHEPPARD Platform Hand Lift Trucks (For Core Room).
1—LINK BELT car puller, #5 capstan.
1—HOUGH Model HA Payloader, hydraulic lift, 12 cu. ft. bucket.

CONVEYOR BELTING

1600'—HEWITT-ROBINS 30" wide, 5 ply rubber covered. Used.
100'—HEWITT-ROBINS 18" wide, 8 ply elevator. Never Used.

CONVEYOR BELTS

1—JEFFREY Trough, 20" x 35' centers.
1—JEFFREY Trough, 24" x 75' centers.
1—JEFFREY Trough, 24" x 103' centers.
1—LINK BELT flat, 24" x 40' centers.
80'—LINK BELT Distributing Belt Conveyor, with (8) Molders Hoppers, with plows and gates, for Squeezer system.

STEEL APRON CONVEYOR

1—LINK BELT 36" x 100' centers, motor and drive.
1—LINK BELT 30" wide by 12S' Apron Type Sorting Conveyor complete w/motor & Drives. On 36" High Stands.

VIBRATING CONVEYOR

1—LINK BELT Model PA 36" x 40' Oscillating Conveyor, with 5 HP Motor. Used less than 6 months—LIKE NEW.
3—SIMPLICITY Model OA-10-A, 36" x 15'.

PORTABLE TROUGH CONVEYOR

1—FARQUHAR, 18" x 35'.

OSCILLATING CONVEYOR

1—LINK BELT 48" x 154'.

ROLLER CONVEYOR

800'—MATHEWS 22" Roller Conveyor, 2¼" Dia., 6" centers, 4" channel iron, complete with stands. LIKE NEW.
200'—MATHEWS 6" Roller Conveyor, 2½" dia., 3" centers, 4" channel iron. Heavy Duty.
500'—MATHEWS 48" Wide Rollers, 5" Dia., 1½" shaft, 12" centers, on 6" channel.
300'—MATHEWS 16"-18" & 20" Wide Rollers, 2⅞" Dia. 4" centers.

CHAIN CONVEYOR

500' JARVIS No. 678, complete with drives.

UNDER CAR UNLOADER

1—FARQUHAR, 18" x 30'.

TRAMRAIL

3—LOUDEN MONORAIL SYSTEMS, "Super Track"
(1) 110' of 6" I-beam & two 20' bridges
(2) 140' of 6" I-beam & two 12' bridges
(3) 130' of 11" I-beam & two 30' bridges: All Complete.
1—AMERICAN TRAMRAIL system with (1) 1 ton 20' span underslung bridge, and 150' of 12" tramrail, with air reels.
4—AMERICAN TRAMRAIL 2 ton cap. 20' span underslung bridge cranes.
2—AMERICAN TRAMRAIL 4 ton cap. 20' span underslung bridge cranes. Chain gear travel, complete.

OVERHEAD CRANES

1—WHITING 5 ton Overhead Crane, 50' span, Cab Operated, AC.

MOLD DRYERS

1—PORBECK Mold Dryer, 42" wide, 8' long, oil fired, Serial No. 242.

MOLD CONVEYOR

1—WEBB 109 Cars, Car Tops 32" x 39".

SAND MULLERS

1—BEARDSLEY & PIPER No. 50 Speedmuller, with Loader and Dust Hood, 50 HP Motor.
1—LINK BELT 48" x 8' Paddle Type.
1—BAKER PERKINS No. 16½, 30 HP.
1—CLEARFIELD, #610 Batch, 6 Cu. Ft.
1—BEARDSLEY & PIPER No. 60 with loader, 75 HP motor.
1—SIMPSON, #1 Style B, Single Wheel, 400# Batch.
1—SIMPSON, #3 Style C, Enclosed Gears —3000#.
1—SIMPSON #2, Style UD, 1500 lbs. Batch. With Loader.
1—SIMPSON, #2, Style C, 1500 lbs., with Loader. Enclosed Gears.
1—DRAVO-DOYLE 6 Cubic Feet Capacity Wonder Model, portable, 5 HP 220-440.
1—SIMPSON No. 1½, style UD, with loader. 700 lbs. batch.

SAND PREPARATORS

6—ROYER Sand Conditioning Units, consisting of:
(1) 1' x 5' Royer Shakeout
(1) Farquhar 18" x 30' Conveyor underneath Shakeout
(1) Royer Model NDS Sand Preparator.
6—B & P Screenarators, Models S, M & L.
1—PEKAY Aerator, Model 320-3. (For Sand System).
8—ROYERS, Models NDP-C-2, NC-4, NDS.
1—SIMPLICITY LP 2'x3', Portable, 3 HP.

SAND CUTTERS

1—AMERICAN Model AA 5'2" Blade.
2—AMERICAN Model M, 79/60.
1—AMERICAN, Model M-Size 99/80.
1—AMERICAN, Model M-Size 89/70.
1—MOULDERS' Friend 60" brush.
1—AMERICAN SandMaster 72"/102".

SAND SLINGERS

2—JEFFREY Swivel type Flask Filler Booms.
1—B & P, 19" Tractor Type, 13' Arm.
1—B & P, 16" Tractor Type, 13' Arm, Magnetic Tower, 4' Ramming 4" Tip.
2—B & P, Model 16S-DB Stationary Type, 16" Head.
2—B & P Swing Type Slingers, 16" Head.
1—B & P Stationary, Double Belt 4' Impeller, 22" head, 5" tip w/50 HP Motor, 10' Jib Arm, 1948.
2—B & P Stationary, Double Belt, 4' Impeller 19" Head, 4" Tip, 6' Jib Arm.
3—PLATE FEEDERS—7' Diameter x 18' Depth, with 10 HP motor & reducer.

SCALES

1—FAIRBANKS-MORSE Open Dial 6250# Cap. Platform 48" x 72".

SHAKEOUTS SCREENS

1—SIMPLICITY 4' x 10' Model D, 16,000#.
1—HEWITT-ROBINS 36" x 78", Vibrex.
1—LINK BELT 5' x 10' heavy duty.
1—SIMPLICITY 6' x 8' Model DE, 16,000#.
6—SIMPLICITY 4' x 10' Model B Single Deck Sifter Screens, with 10 HP Motors.

TUMBLING BARRELS

2—SLY 42" x 72" Square, 10 HP, Gearhead with Built-in Brake. Timken Bearing.
2—SLY 36" x 84" Type C, 7½ HP. Gearhead Built-in Brake. Timken Bearing.
4—WHITING 48" x 72", 10 HP Gearhead, with Built-in Brake. Timken Bearing.
1—SLY 48" x 96" w/Motor & Drive & Mag. Brake, Timken Bearing.
1—SLY 72" x 120" w/Motor ½ Drive & Mag. Brake, Timken Bearing.

SAND BLAST EQUIP.

1—AMERICAN 86" diameter swing table with dust collector.
1—AMERICAN No. 3 tablast, 4-48" auxiliary tables.
1—AMERICAN No. 1 tablast 7-14" auxiliary tables.
1—AMERICAN 27" x 36" Tumblast with skip hoist, shot return & electrical.
1—AMERICAN 36" x 42" Tumblast with Skip Hoist, Shot return & electrical.
1—AMERICAN 42" x 48" Tumblast, with Skip Ho'st, Shot return & electrical.
1—AMERICAN 48" x 48" tumblast, with loader. New belt, excellent.
1—HOLLINGSWORTH Model 44" x 48".
1—HYDRO-BLAST cabinet, 40 HP motor and pump.
1—PANGBORN 9LG-14 Multi-Table Blast 9' Dia. table, 4-48" Dia. Aux. tables w/2 Roto-Blast Heads. New 1951.
1—PANGBORN Type 44NF Car Type Mechanical Blast Room, 10' L x 11' W x 7'6" H. w/CH-2. New 1951.

TESTING EQUIPMENT

1—GENERAL ELECTRIC X-RAY, Industrial Type. Model KX10, 140 KW.

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COMPLETELY MECHANIZED SAND HANDLING SYSTEM . . . NEW IN 1951

- SAND DISTRIBUTING CONVEYOR—18 STATIONS
- SHAKEOUT AND SAND RETURN CONVEYOR
- VIBRA SCREEN—PUG MILL BUCKET ELEVATOR

CALL NOW ! ! TO SEE IN OPERATION

SHOT BLAST EQUIPMENT: PANGBORN TYPE MTS CABINET WITH TABLE
PANGBORN TYPE EN-2 CABINET

MOLDING MACHINES: SQUEEZERS, ALSO 4—#405 OSBORN ROLL-OVERS
3—#2047 OSBORN ROLL-OVERS

CORE OVEN: 2 DOOR DESPATCH—GAS FIRED WITH CONTROLS

2—400 TON KUX ZINC DIE CASTING MACHINES.

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GUARANTEED REBUILT EQUIPMENT

AIR COMPRESSORS
COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS
25—CENTRIFUGAL, 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT
1—AMERICAN WHEELABRATOR TUMBLAST 1945, 48" x 72", with Skip Loader, Vert. bucket conveyor, motors & controls

1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—PANGBORN TABLAST, 8' Table
1—PANGBORN ROTOBLAST, #BVR-5
1—PANGBORN ROTOBLAST, #28, Type GK
1—PANGBORN BLAST CABINET, #EP-5
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 36"
1—CRESCENT METAL CUTTING BANDSAW, 30"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W

CONVEYORS
1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, 21'6" x 24", with drive
1—LINK BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
1—JEFFREY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS
3—DEMMLER #2, vert. or horiz.
1—DEMMLER #3K
2—OSBORN #91, #92
2—OSBORN #192, #193
1—CHAMPION, Model CB-400
1—INTERNATIONAL SB-13
1—OSBORN Core Rollover, #136-3, (NEVER USED)

CUPOLAS
2—WHITING #5 complete with Skip Charger and Blower
1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets

DUST COLLECTORS
4—ROTOCLONE, #12, Type N, wet type
1—ROTOCLONE, #16W
2—ROTOCLONE, Size 20D, Hopper type F

FLASKS
150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets

200 TRANSITE CORE PLATES, Various Sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING
1—3,000#/hr. LECTROMELT
1—3000#/hr. HEROULT
1—6 Ton/hr. HEROULT
1—250#/hr. Single Phase

FURNACES—INDIRECT ARC
1—350#/hr. DETROIT, Complete
1—1,000#/hr. DETROIT, Complete
1—2,000#/hr. DETROIT, Complete

FURNACES—INDUCTION MELTING
2—333 KW, AJAX-TAMA-WYATT, 1500# Alum., 60 cycle
1—333 KW, AJAX M.G. Type with Furnaces, 960 cycle
1—30 KW, LEPEL
1—20 KW, AJAX SPARK GAP, High Frequency
1—3 KW, AJAX, Lab type

SPECIAL OFFERING
NATIONAL ENGR. SAND HANDLING SYSTEM
2—SIMPSON #3 Mullers, 3 Overhead Hoppers, FAIRBANKS 3,000# Scale, 20 ft. Motorized pit Conveyor, ROTO-CLONE Dust Collector, STEDMAN PULVERIZER, BELT CONVEYOR 24" x 24', Wash Tank, All Motors, Drives and Controls.
HEWITT ROBINS COKE SYSTEM
1—42' Vibrating CONVEYOR, 2 VIBREX COKE SCREENS, 3 Storage Hoppers, FAIRBANKS SCALE
THESE UNITS SPECIALLY PRICED FOR IMMEDIATE REMOVAL—CAN BE SEEN ERECTED NOW!

FURNACES—GAS & OIL
1—FISHER MNP, Gas, Tilting, 1700# cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500# cap.
4—FISHER MNP, Oil, Tilting, with blowers, 500# cap. Alum.
4—FISHER MNP, Oil, with blowers, 1500# cap. Brass
3—FISHER, Oil, Stationary, model 125, type S, Brass
1—REDA, Gas #550
1—DEMPSEY, Reverberatory, 10,000#, 9' W x 14' L x 9' H, Oil
1—HAUSFELD, Gas, Stationary, 1000#
1—HAUSFELD, Gas, Stationary, 70-80# Alum.
1—SKLENAR, Oil, 600# Cap.
1—STROMAN, Gas, Tilting, 1,000# cap. Alum., auto control, hyd. lift

MOLDING MACHINES
Jolt Rollovers
1—J & J #1020, 50" x 60", 20" draw
1—J & J #920RC
2—J & J #918
1—J & J #815, 30" x 40", 15" draw, 1200# jolt
1—J & J #612, 24" x 30", 12" draw
3—J & J #610, 24" x 30", 10" draw
1—INTERNATIONAL, Type G, 24" x 10"
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750#, 30" x 36"
1—OSBORN #602
2—OSBORN #405-86, with levelling carriage
1—OSBORN #405, 3,000#, flask size 64" x 50", 18" draw
1—OSBORN #333
1—OSBORN #332
2—OSBORN #243, 27" x 40", 20" draw
2—OSBORN #242, Rockover draw, w/oil cylinder and operating valve
4—OSBORN #142, 15" x 20", hand draw
3—OSBORN #2047
1—TABOR, 30" x 40" with air clamps
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 22" x 32", with air clamps
2—TABOR, 14" x 16" Rockover

Bumpers
2—DAVENPORT, 30" x 30" table
1—DAVENPORT, 24" x 27" table

Jolt Strippers
1—J & J, 30" x 24" table, 600# cap.
2—SPO #305, 20" x 27" table, 750# cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 20" x 20" table, hand strip
1—MILWAUKEE #1536, 32" x 38"
1—INTERNATIONAL 1255 PKL
1—OSBORN #559

Jolt Squeeze Strippers
1—OSBORN #175, 21" x 18", portable
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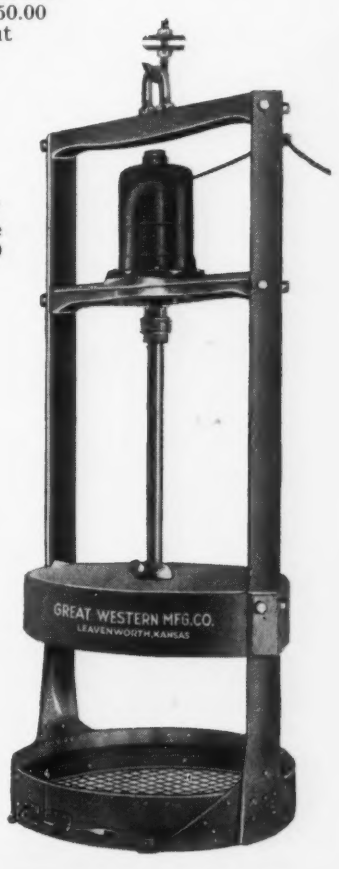

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Prompt Delivery From Your Foundry Supply House

GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS

Circle 800 on Inquiry Card—Page 245

LADLES ENGINEERED TO THE JOB

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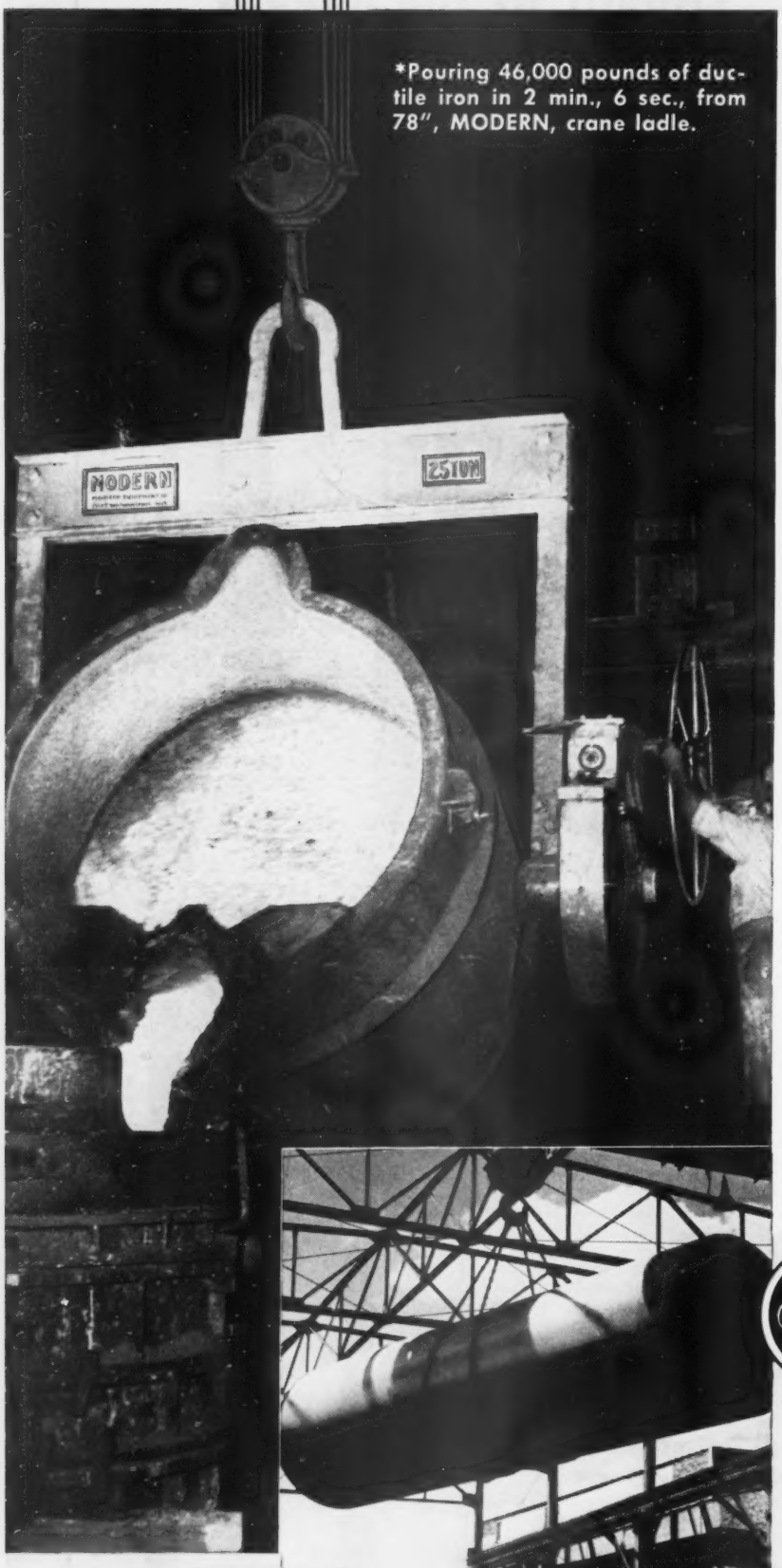
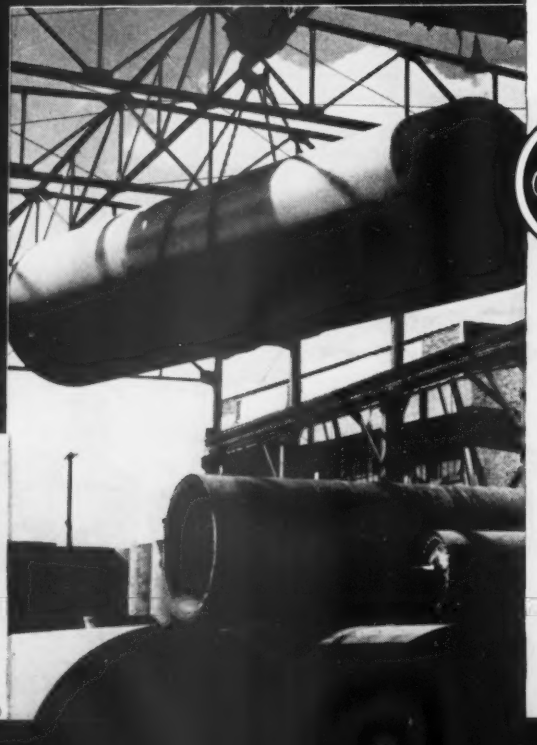


*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.



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2 MORE PAY-TIME OVER THE MOLD . . .
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Metal pouring systems, 147 ☐
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Circle 801 on Inquiry Card—Page 245

NEW PRODUCT IDEAS FOR THE CO_2 PROCESS

A number of proven products for the CO_2 process, that will improve cores and molds, cut costs and promote casting quality are now being manufactured by Stevens.

If you are now using, or are interested in, the latest foundry development, the CO_2 (carbon dioxide) process, write today for the new Stevens Technical Bulletin FA-130,

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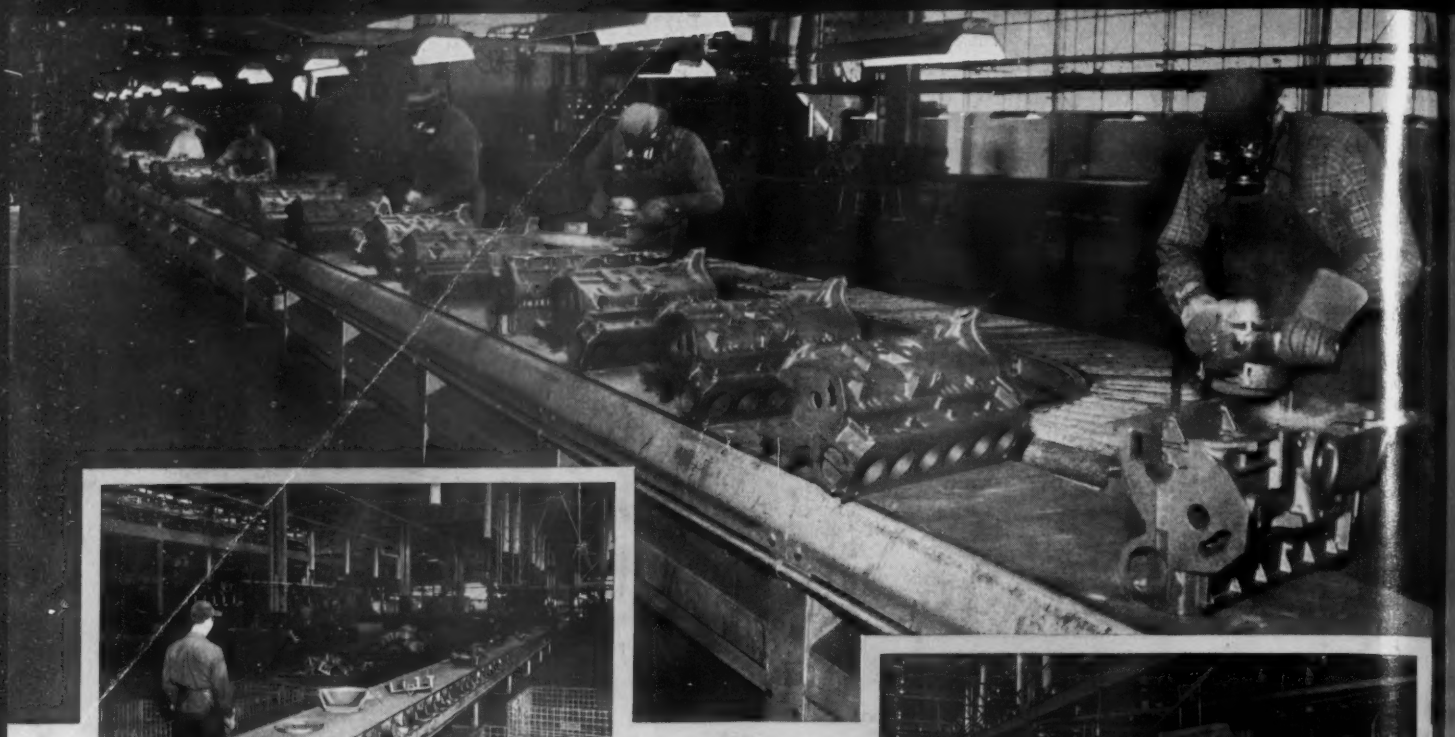

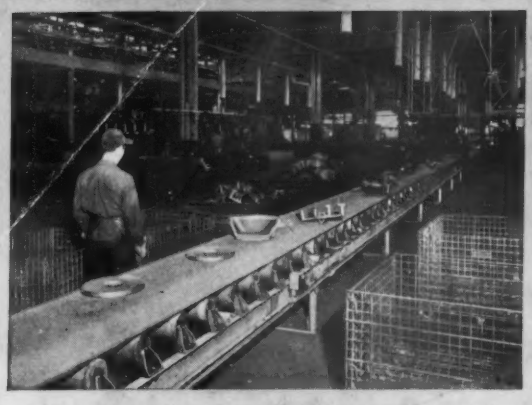

Above; Unloading Zone of 315' Long Sorting Belt Handling Miscellaneous Castings After Grinding.

Above; 370' Long—24" Wide Flat Top Chipping Conveyor Handling Automotive Castings Through Various Cleaning Room Operations. *At the Right;* 130' Long Chipping Conveyor for Finishing Head Castings.

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. . . assure the continuous, uninterrupted flow of castings through chipping, grinding, sorting and inspection departments; — eliminate repeated handling and rehandling of work in process; — avoid stock piling between operations; — increase tons per hour production per man; — and reduce costs.

Apron Conveyor Handling Hot Castings from Vibrating Shakeout.

● Bartlett-Snow castings handling and cleaning room installations reduce the time and cost of handling castings from the shakeout to the shipping room. They synchronize and coordinate all cleaning room operations to the tonnage passing over the foundry shakeout. Belt, apron, oscillating, roller, car type and slat conveyors, engineered to meet your individual requirements!

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